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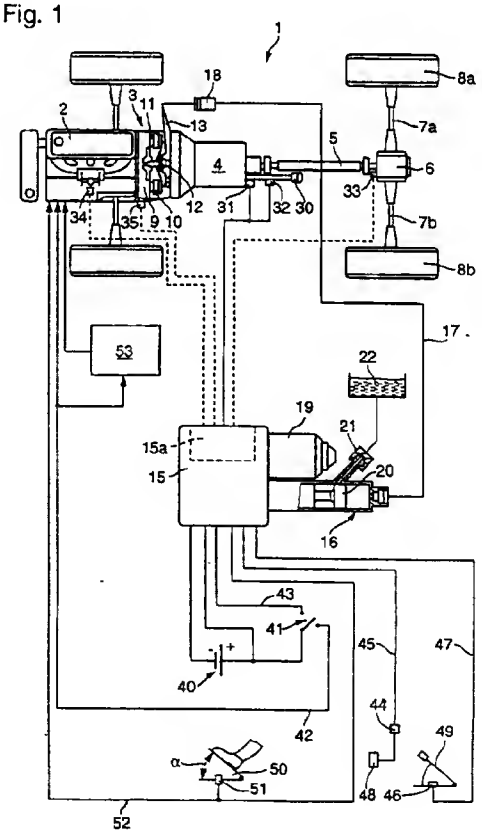
GB 1003195 A

(58) Field of Search
UK CL (Edition P) F2D DA , F2L LD LT
INT CL[6] B60K 28/00 , F02N 11/10

(54) Control of engine starting in a motor vehicle with an automatically-controlled clutch

(57) A motor vehicle 1 with an engine 2, an automatic clutch 3 and a gearbox 4 has a control unit 15a and an actuator 15 controllable by the control unit for operating the clutch. Upon attempted starting of the engine, the control unit 15a receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox. The control unit, when it detects that neutral position is engaged in the gearbox, disengages the clutch and sends a starter release signal to allow starting of the engine. When neutral position is not engaged, the control unit either does not allow starting of the engine or disengages the clutch and checks that brakes are applied before the engine is started. The engine may be started automatically if starting is attempted with neutral not engaged and neutral is subsequently selected within a predetermined time.

Fig. 1



GB 2 317 660 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig. 1

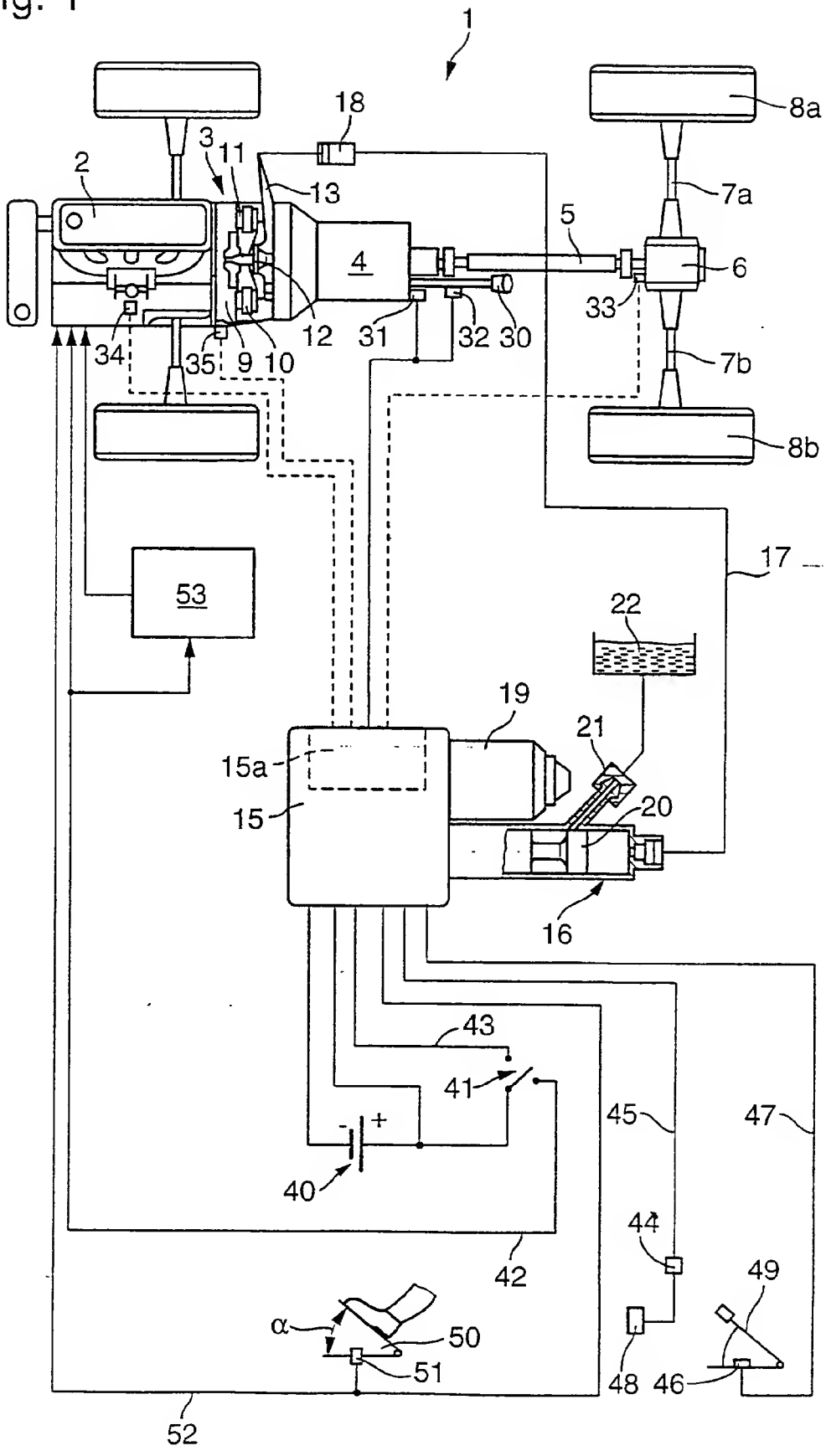

1
18
8a
3
11
2
13
7a
5
4
6
33
12
31
32
30
34
35
9
10
7b
8b
17
53
22
19
21
15a
20
15
16
43
41
45
47
40
44
42
49
α
50
51
48
46
52

Fig. 2

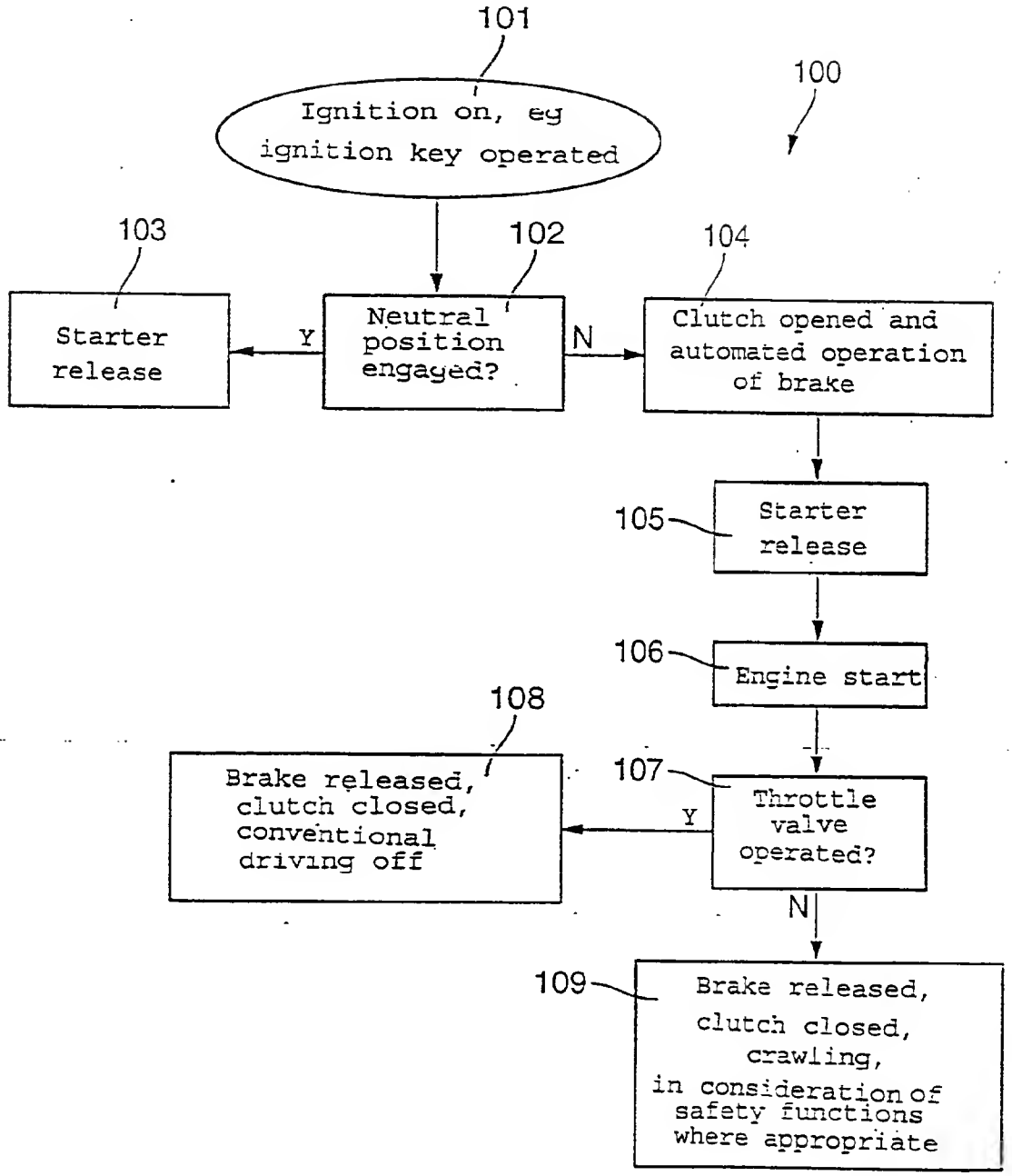

101
Ignition on, eg ignition key operated
100
103
102
104
Starter release
Y
Neutral position engaged?
N
Clutch opened and automated operation of brake
105
Starter release
106
Engine start
108
Brake released, clutch closed, conventional driving off
107
Y
Throttle valve operated?
N
109
Brake released, clutch closed, crawling, in consideration of safety functions where appropriate

Fig. 3

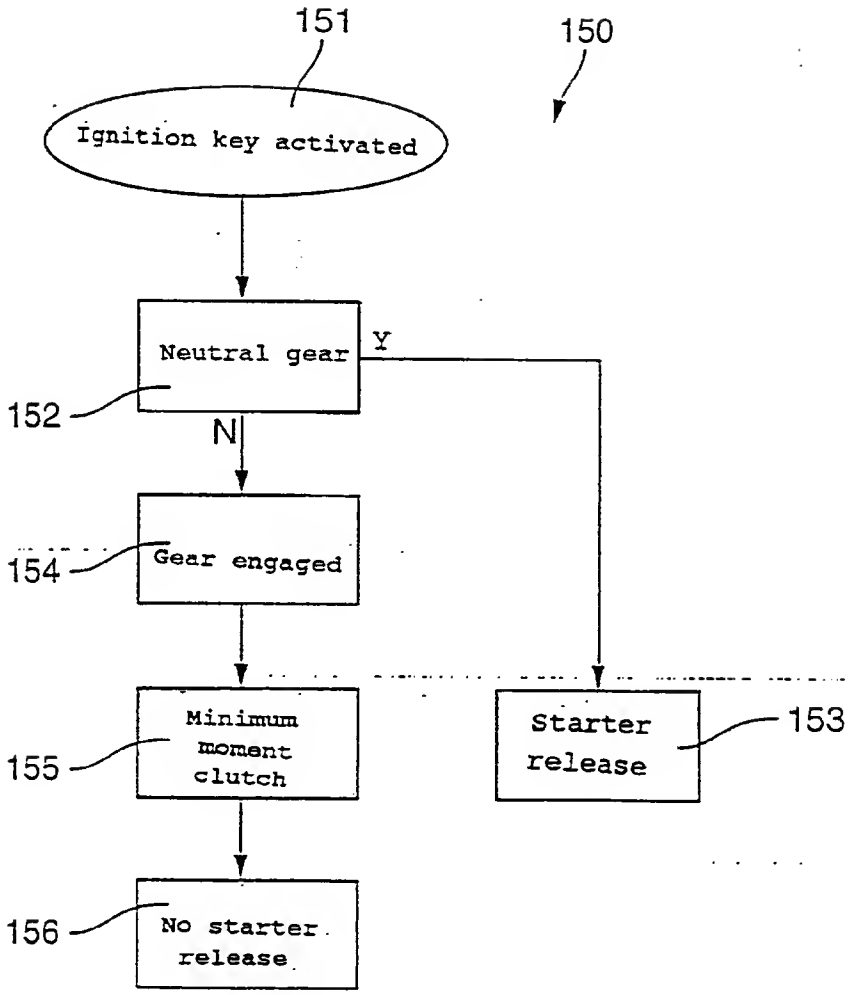

151
150
Ignition key activated
Neutral gear
Y
152
N
154
Gear engaged
155
Minimum moment clutch
Starter release
153
156
No starter release

Fig. 4

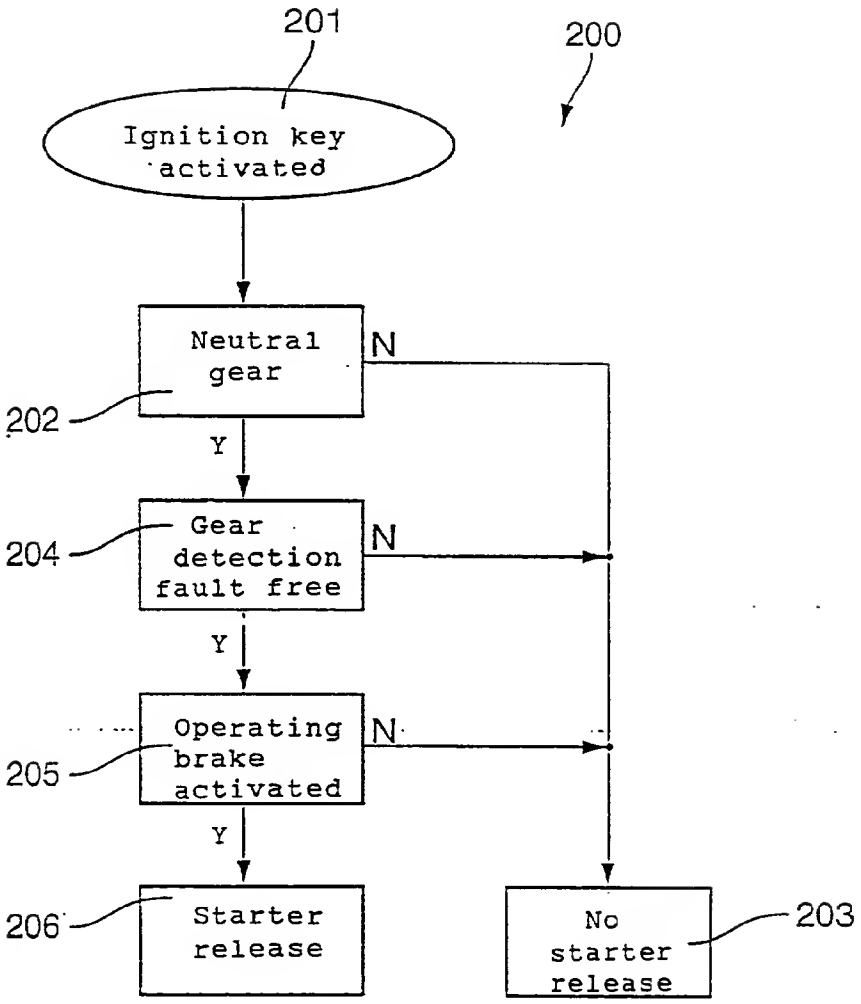

201
200
Ignition key activated
Neutral gear
N
202
Y
Gear detection fault free
204
N
Y
Operating brake activated
N
205
Y
Starter release
206
No starter release
203

Fig. 5

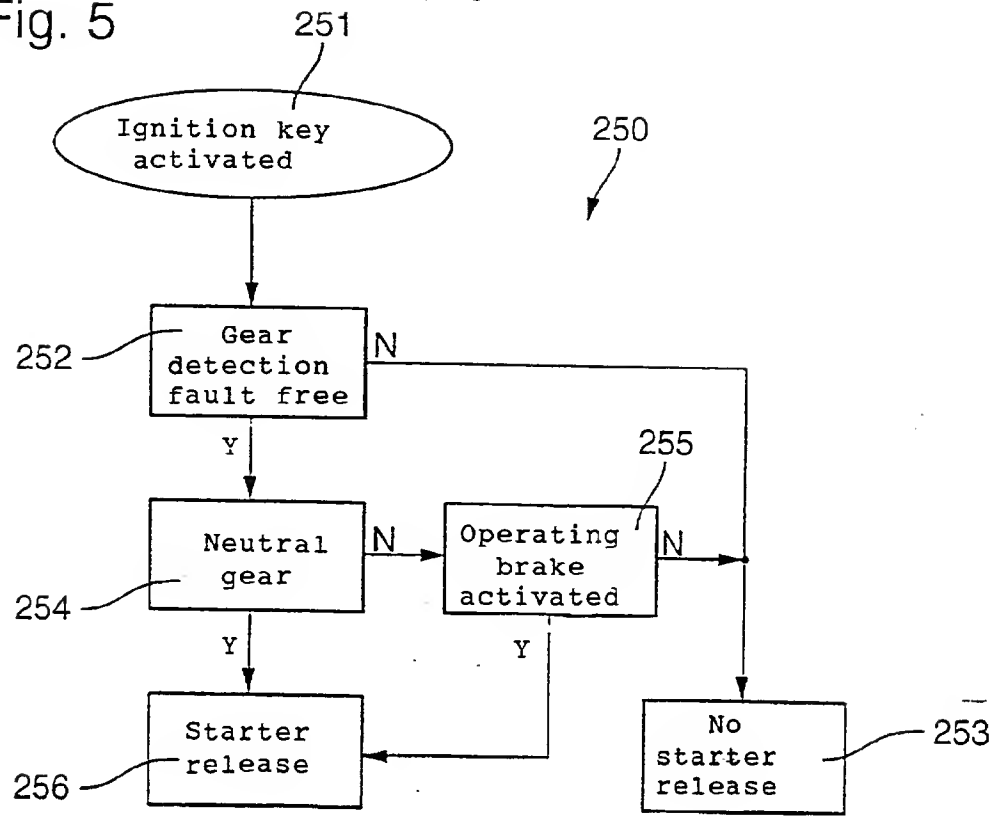

251
Ignition key activated
250
252
Gear detection fault free
N
Y
255
Neutral gear
N
Operating brake activated
N
254
Y
Y
Starter release
No starter release
253
256

Fig. 6

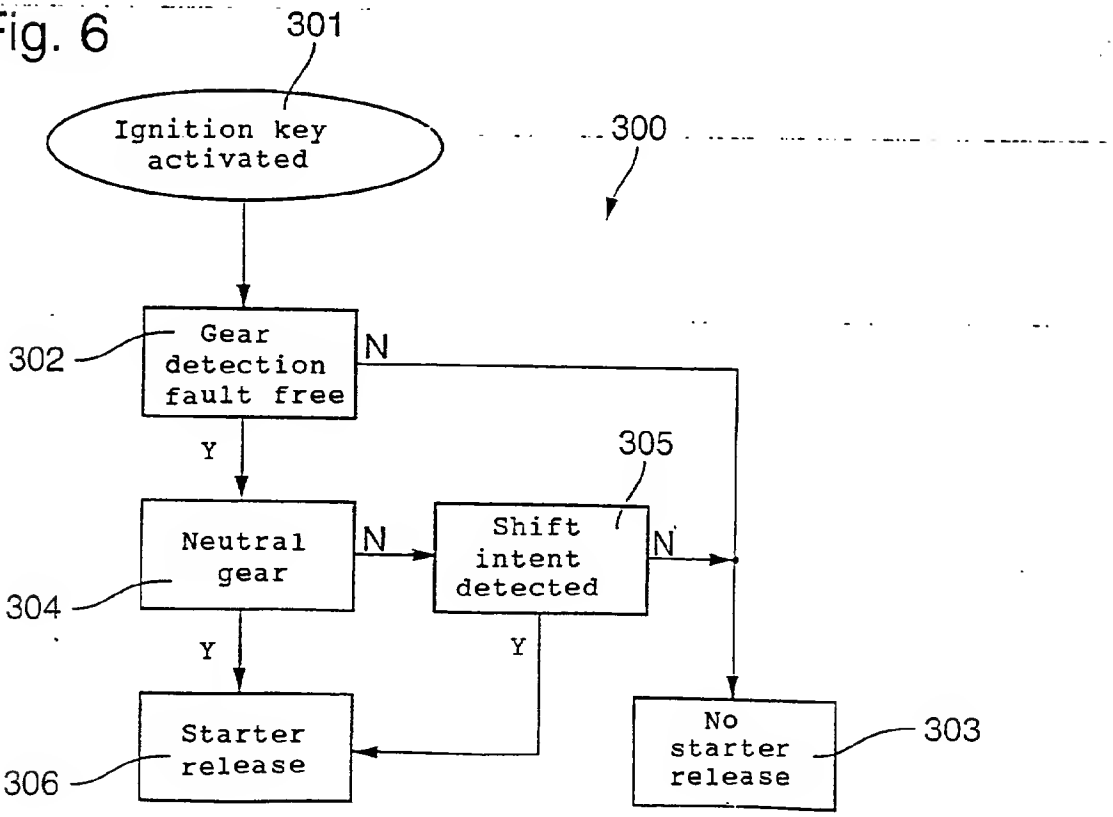

301
Ignition key activated
300
302
Gear detection fault free
N
Y
305
Neutral gear
N
Shift intent detected
N
304
Y
Y
Starter release
No starter release
303
306

Fig. 7

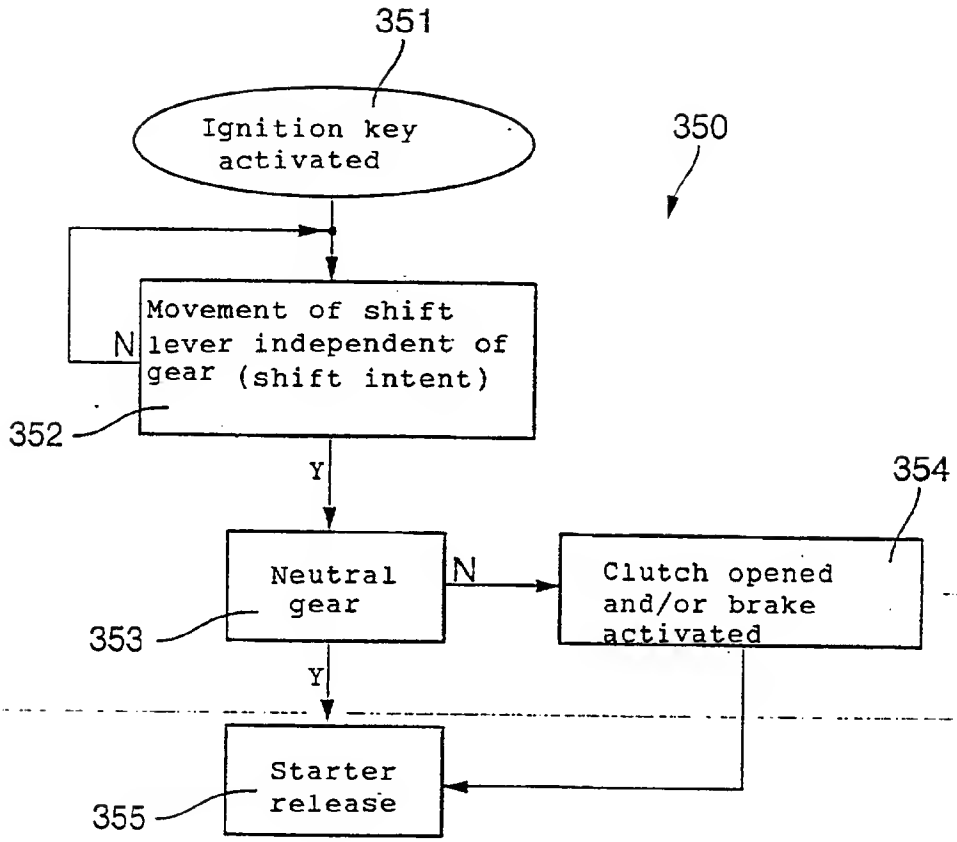

351
Ignition key activated
350
Movement of shift lever independent of gear (shift intent)
N
352
Y
354
Neutral gear
N
Clutch opened and/or brake activated
353
Y
Starter release
355

Fig. 8

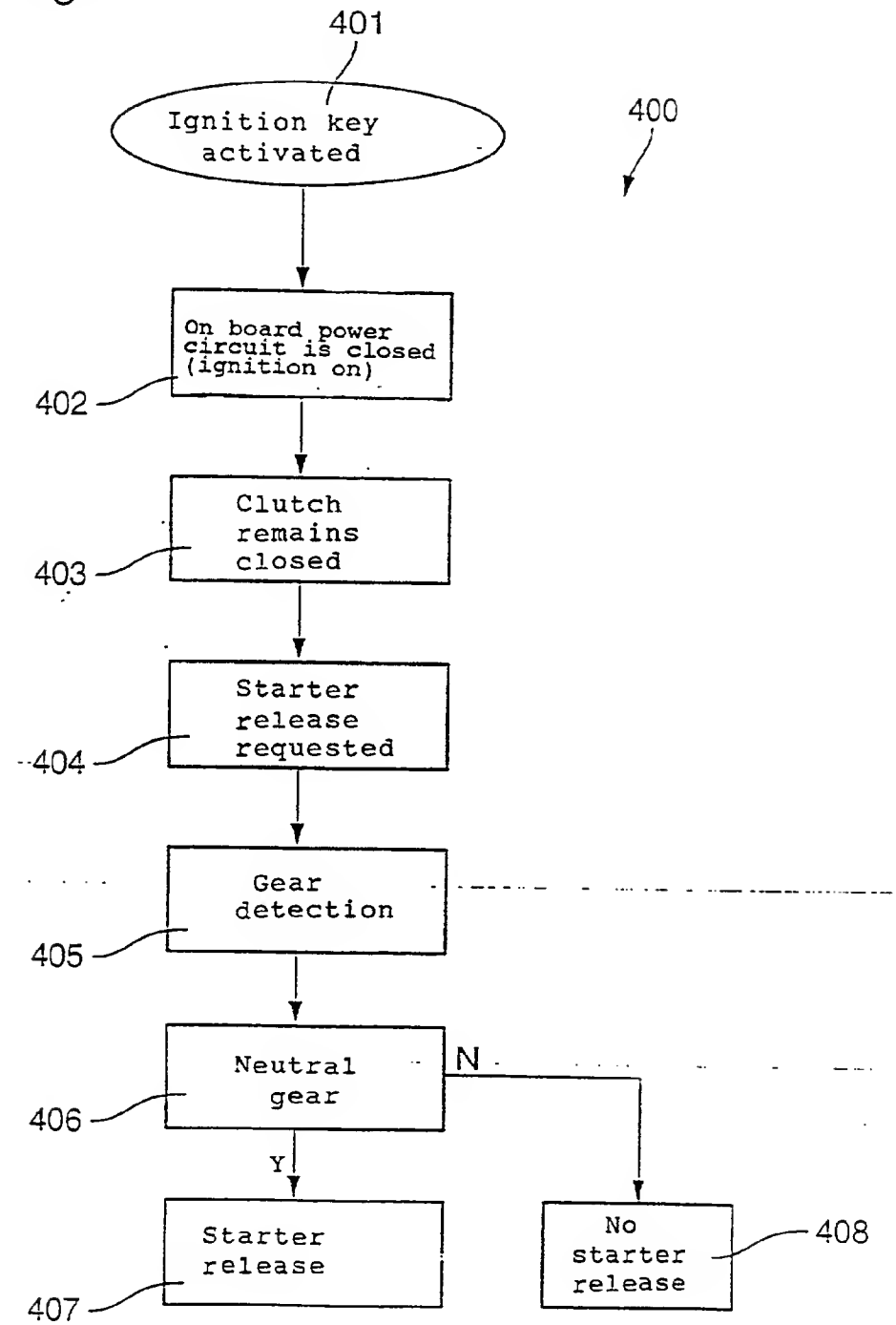

401
Ignition key activated
400
On board power circuit is closed (ignition on)
402
Clutch remains closed
403
Starter release requested
404
Gear detection
405
Neutral gear
406
N
Y
Starter release
407
No starter release
408

Fig. 9

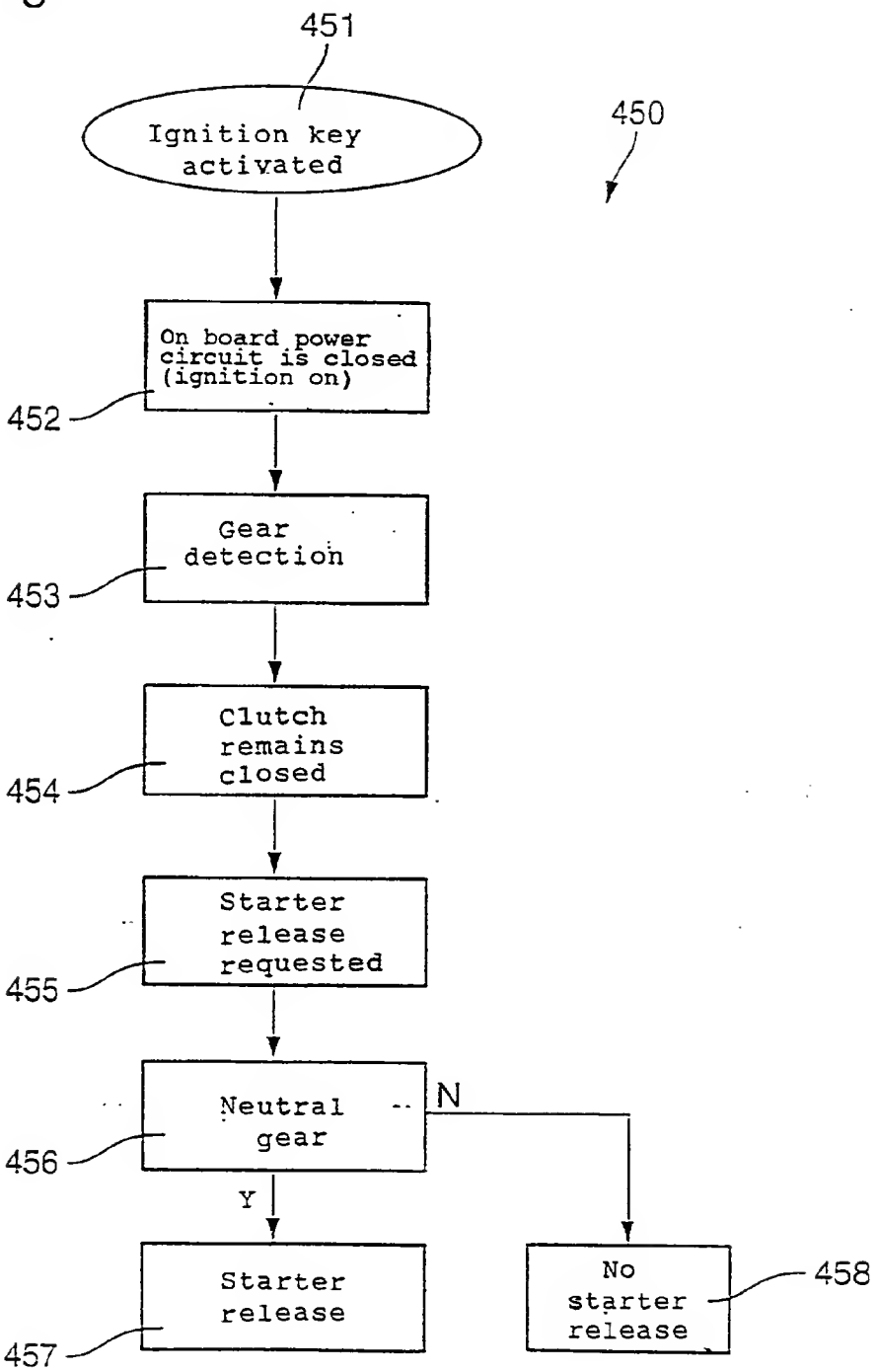

451
Ignition key activated
450
On board power circuit is closed (ignition on)
452
Gear detection
453
Clutch remains closed
454
Starter release requested
455
Neutral gear
456
N
Y
Starter release
457
No starter release
458

Fig. 10

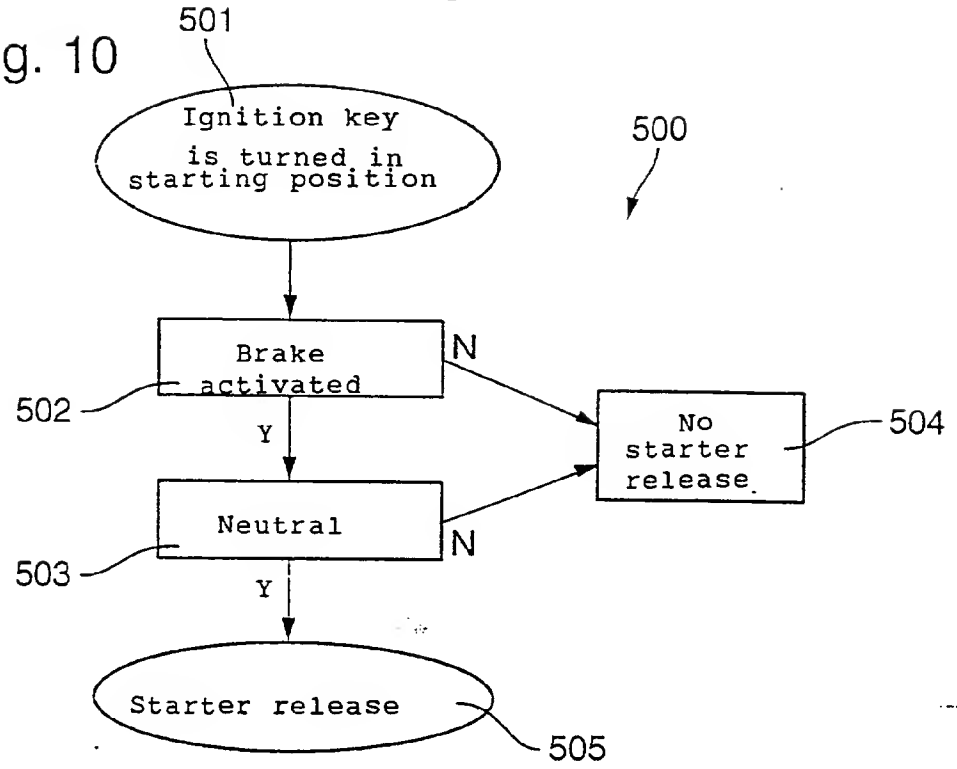

501
Ignition key is turned in starting position
500
Brake activated
N
502
Y
No starter release
504
Neutral
N
503
Y
Starter release
505

Fig. 11

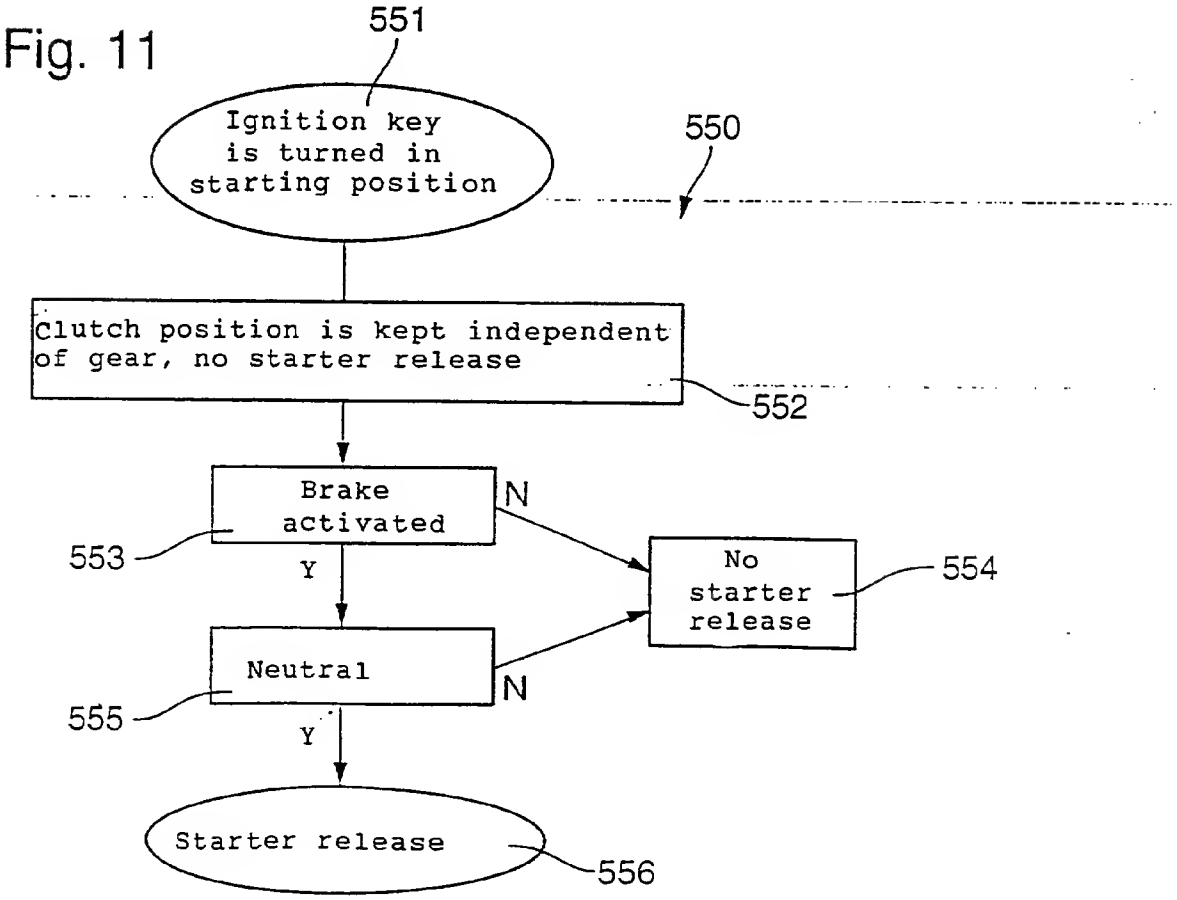

551
Ignition key is turned in starting position
550
Clutch position is kept independent of gear, no starter release
552
Brake activated
N
553
Y
No starter release
554
Neutral
N
555
Y
Starter release
556

Fig. 12

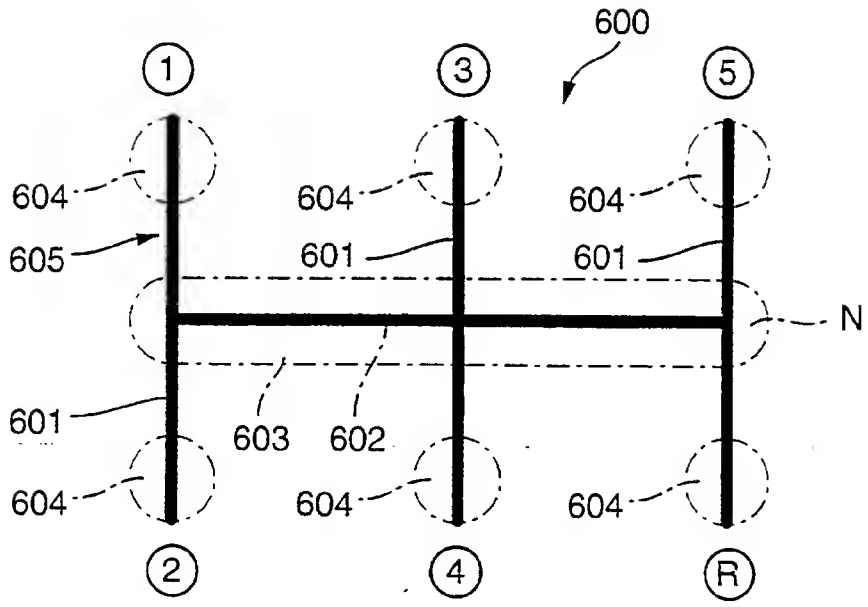


Fig. 13

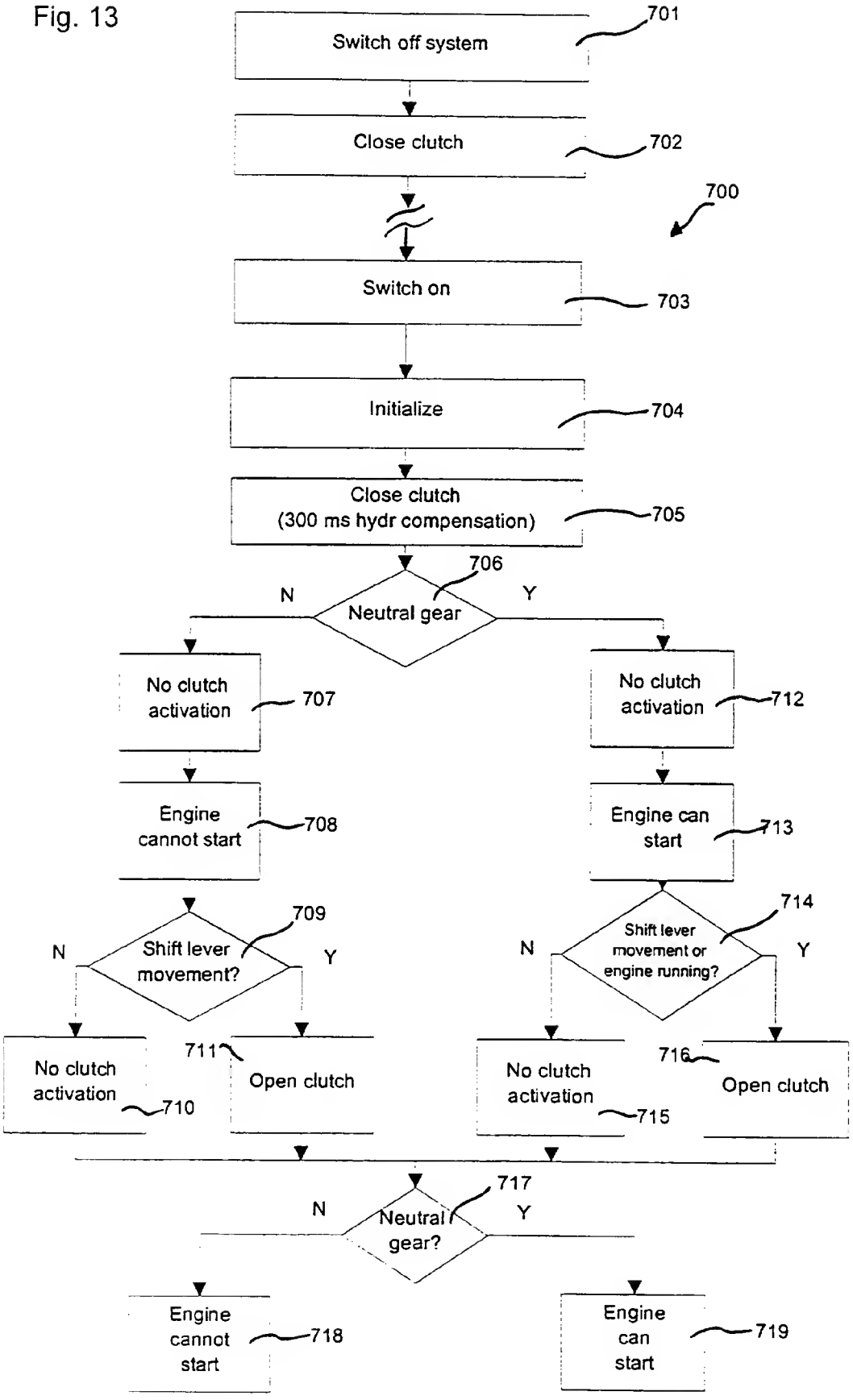

Switch off system
701
Close clutch
702
700
Switch on
703
Initialize
704
Close clutch
(300 ms hydr compensation)
705
706
Neutral gear
N
Y
No clutch activation
707
Engine cannot start
708
709
Shift lever movement?
N
Y
No clutch activation
710
711
Open clutch
No clutch activation
712
Engine can start
713
714
Shift lever movement or engine running?
N
Y
No clutch activation
715
716
Open clutch
717
Neutral gear?
N
Y
Engine cannot start
718
Engine can start
719

Fig. 14

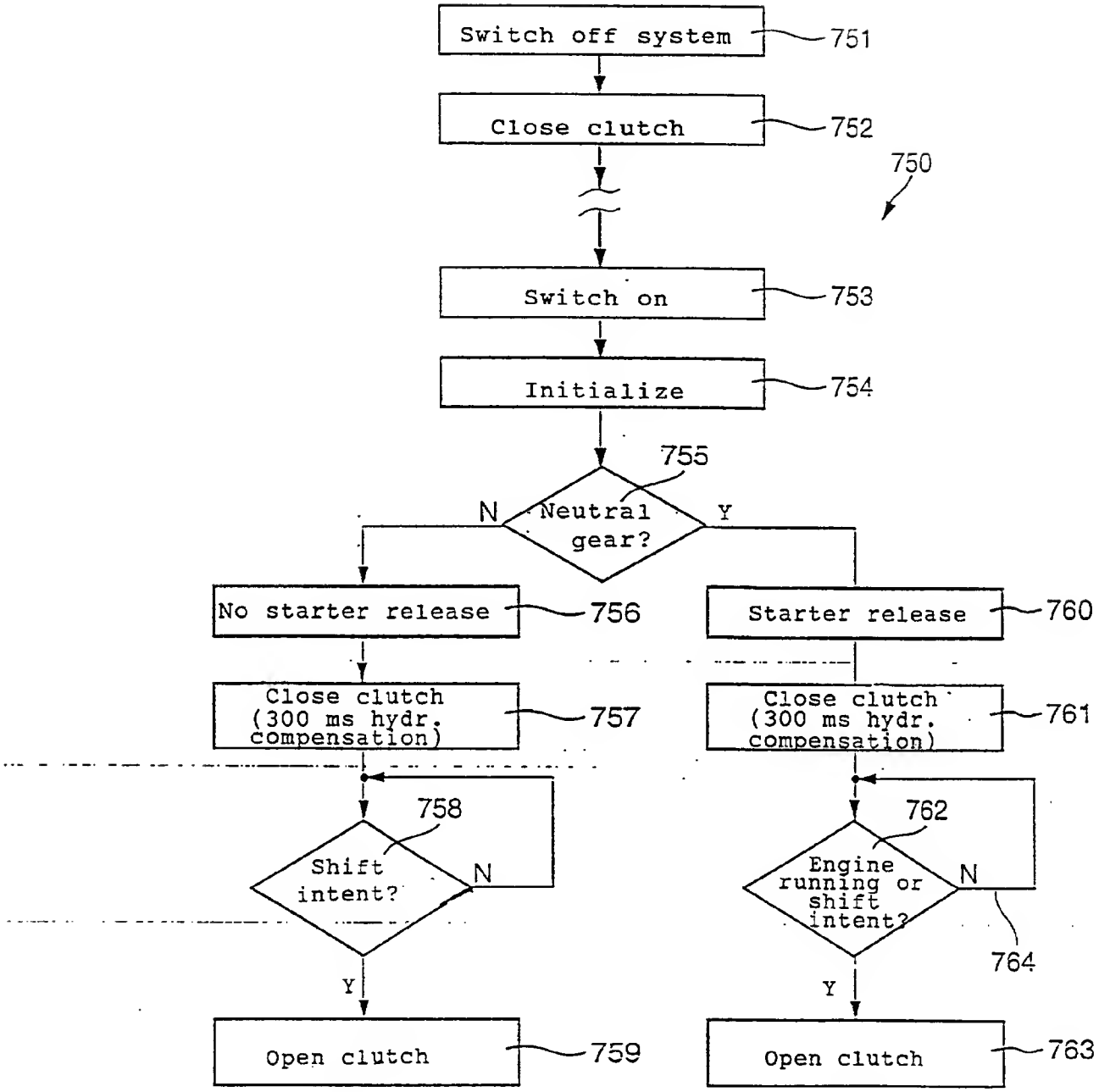

Switch off system
751
Close clutch
752
750
Switch on
753
Initialize
754
755
Neutral gear?
N
Y
No starter release
756
Starter release
760
Close clutch (300 ms hydr. compensation)
757
Close clutch (300 ms hydr. compensation)
761
758
Shift intent?
N
Y
762
Engine running or shift intent?
N
764
Y
Open clutch
759
Open clutch
763

Fig. 15

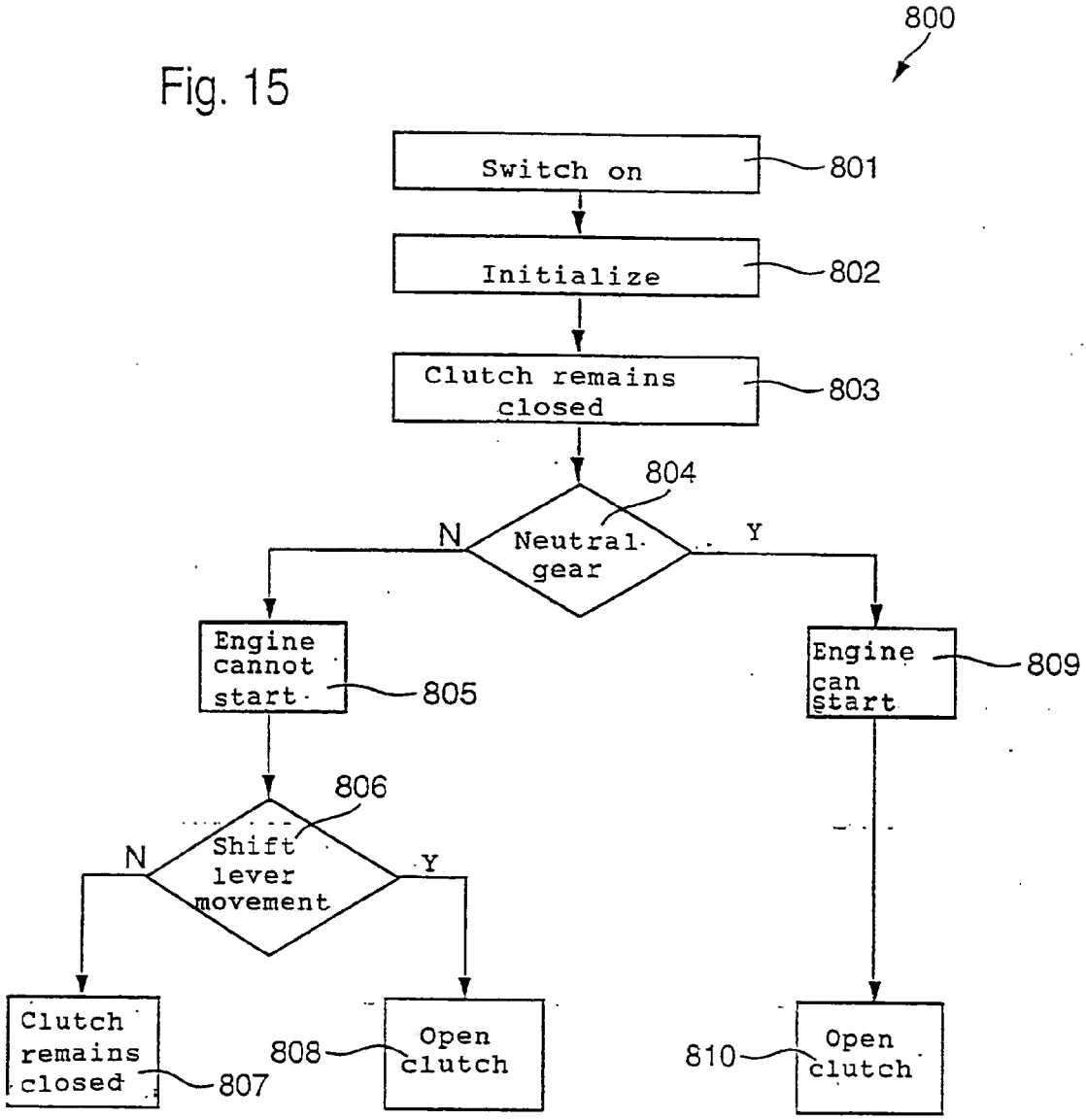

800
Switch on
801
Initialize
802
Clutch remains closed
803
804
Neutral gear
N
Y
Engine cannot start
805
Engine can start
809
806
Shift lever movement
N
Y
Clutch remains closed
807
808
Open clutch
810
Open clutch

Fig. 16

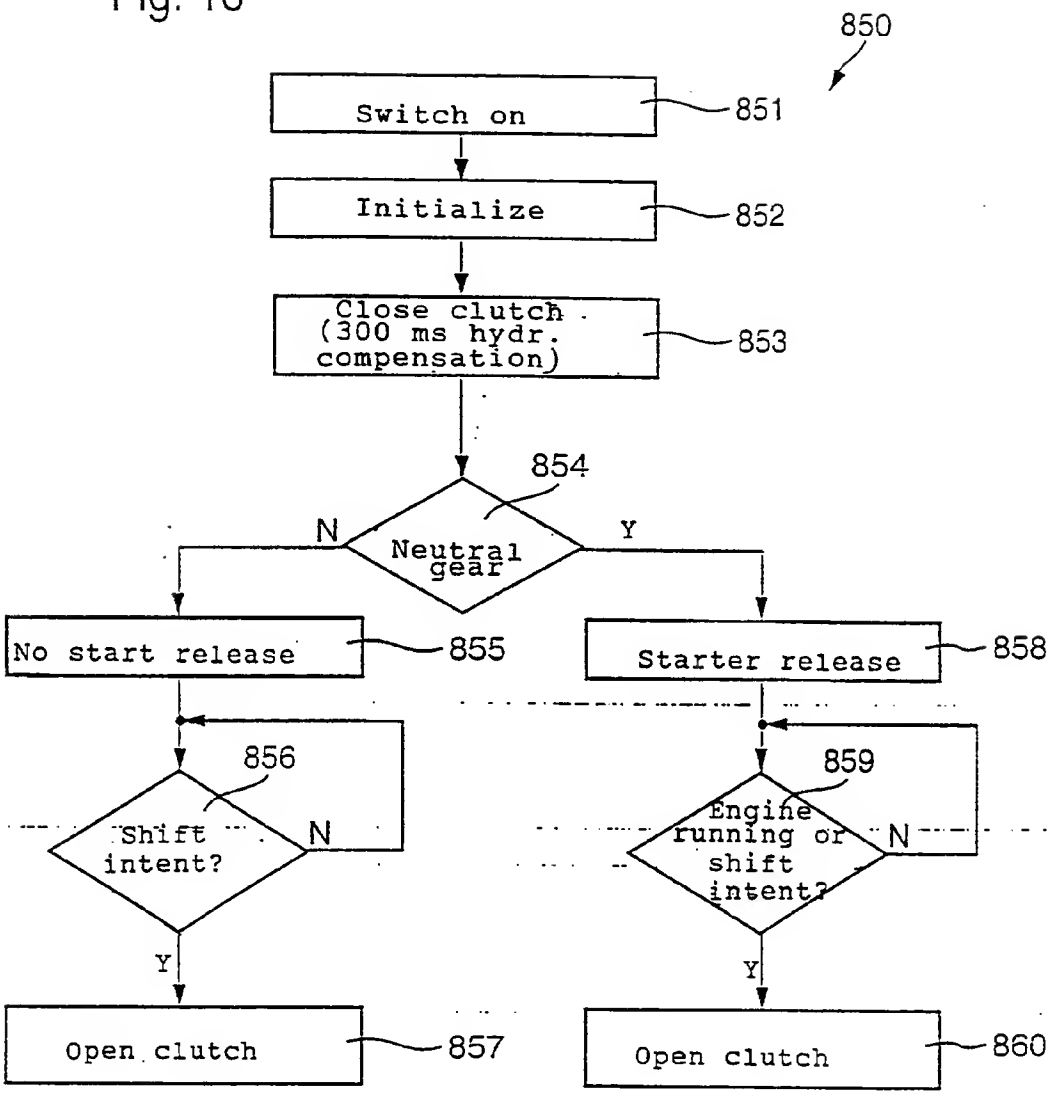

850
Switch on
851
Initialize
852
Close clutch (300 ms hydr. compensation)
853
854
Neutral gear
N
Y
No start release
855
Starter release
858
856
Shift intent?
N
Y
859
Engine running or shift intent?
N
Y
Open clutch
857
Open clutch
860

Fig. 17

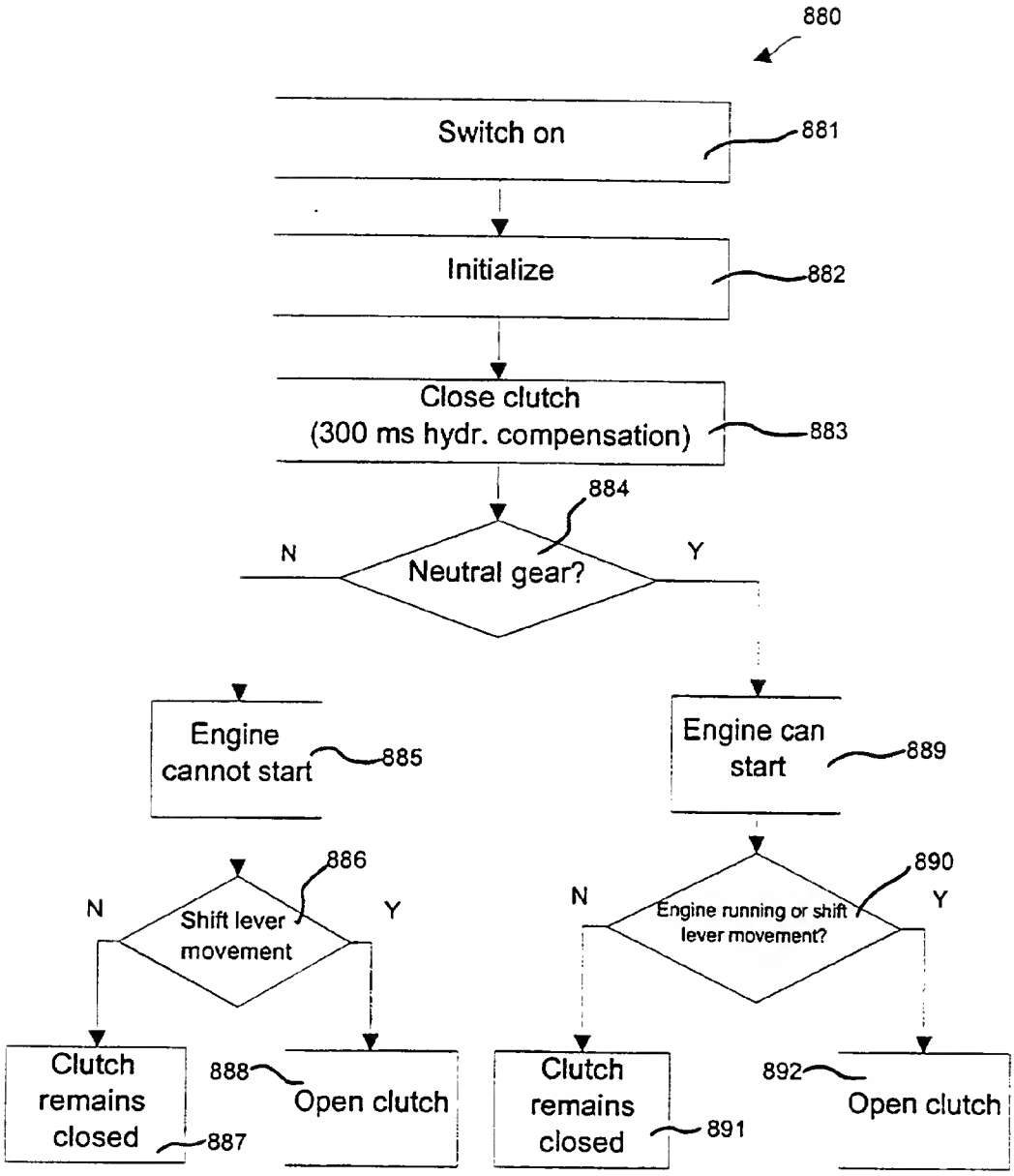

880
Switch on
881
Initialize
882
Close clutch
(300 ms hydr. compensation)
883
884
N
Neutral gear?
Y
Engine
cannot start
885
Engine can
start
889
886
N
Shift lever
movement
Y
890
N
Engine running or shift
lever movement?
Y
Clutch
remains
closed
887
888
Open clutch
Clutch
remains
closed
891
892
Open clutch

Fig. 18

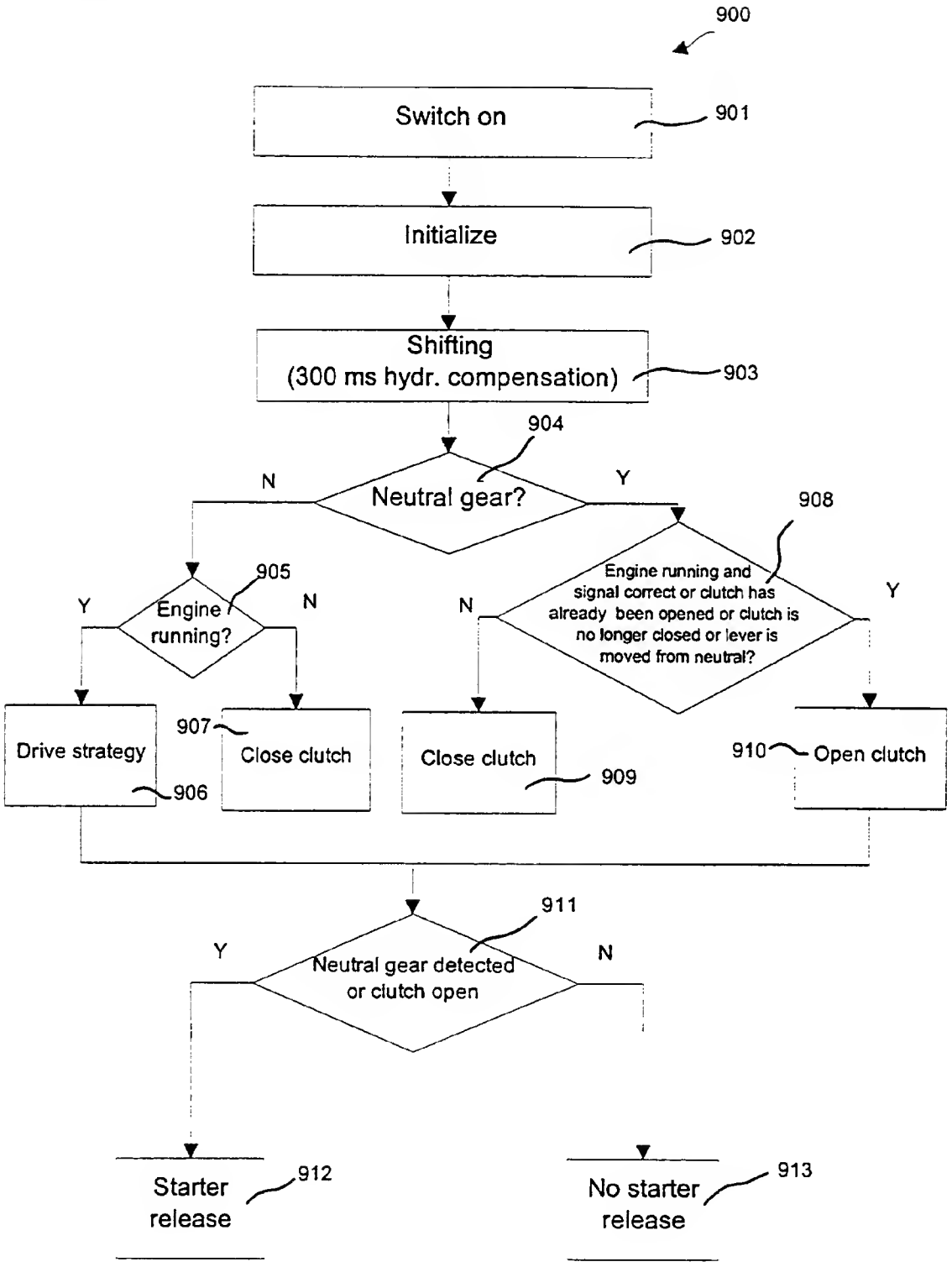

900
Switch on
901
Initialize
902
Shifting
(300 ms hydr. compensation)
903
904
Neutral gear?
N
Y
905
Engine running?
Y
N
908
Engine running and signal correct or clutch has already been opened or clutch is no longer closed or lever is moved from neutral?
N
Y
Drive strategy
906
907
Close clutch
Close clutch
909
910
Open clutch
911
Neutral gear detected or clutch open
Y
N
Starter release
912
No starter release
913

Fig. 19

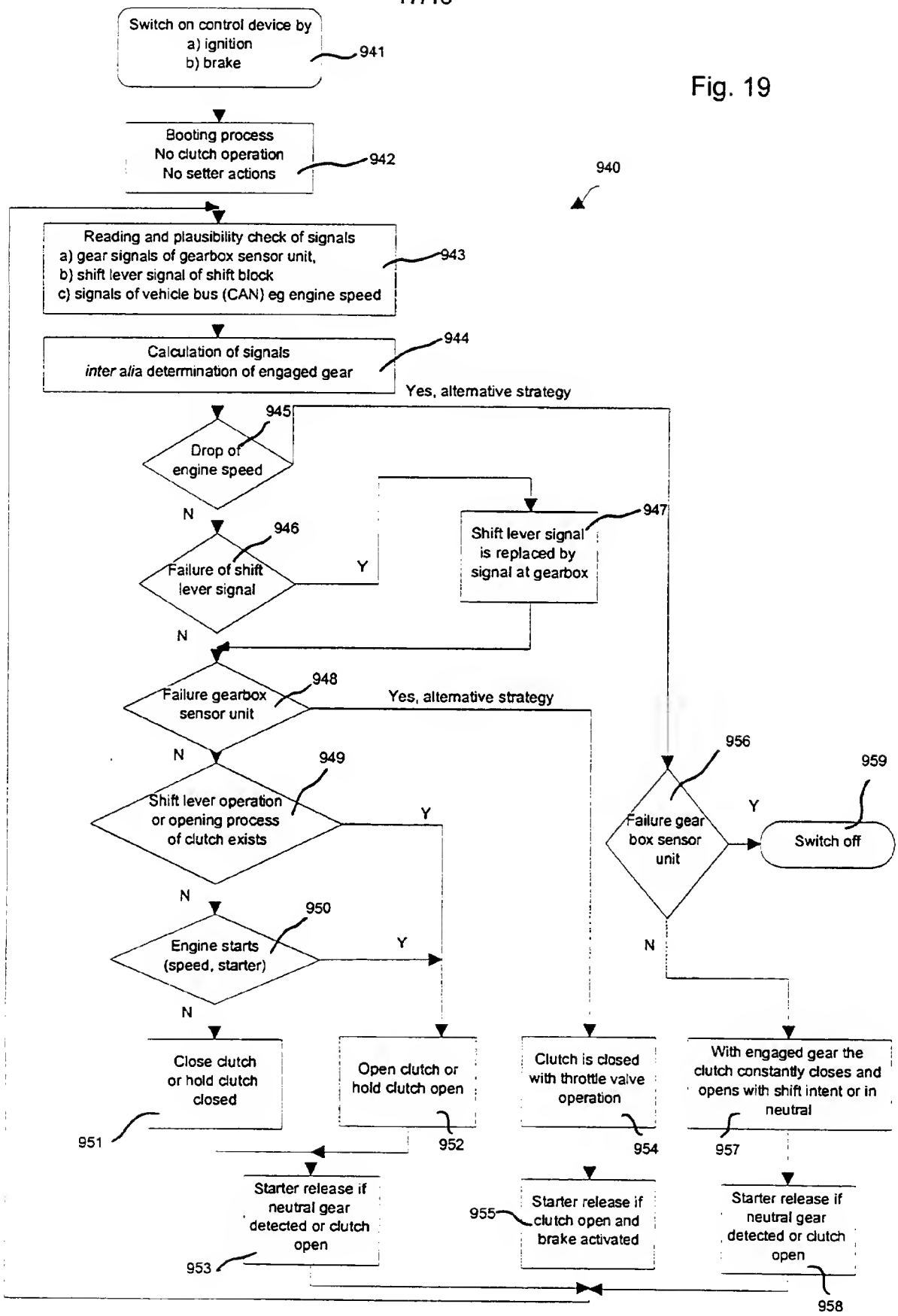
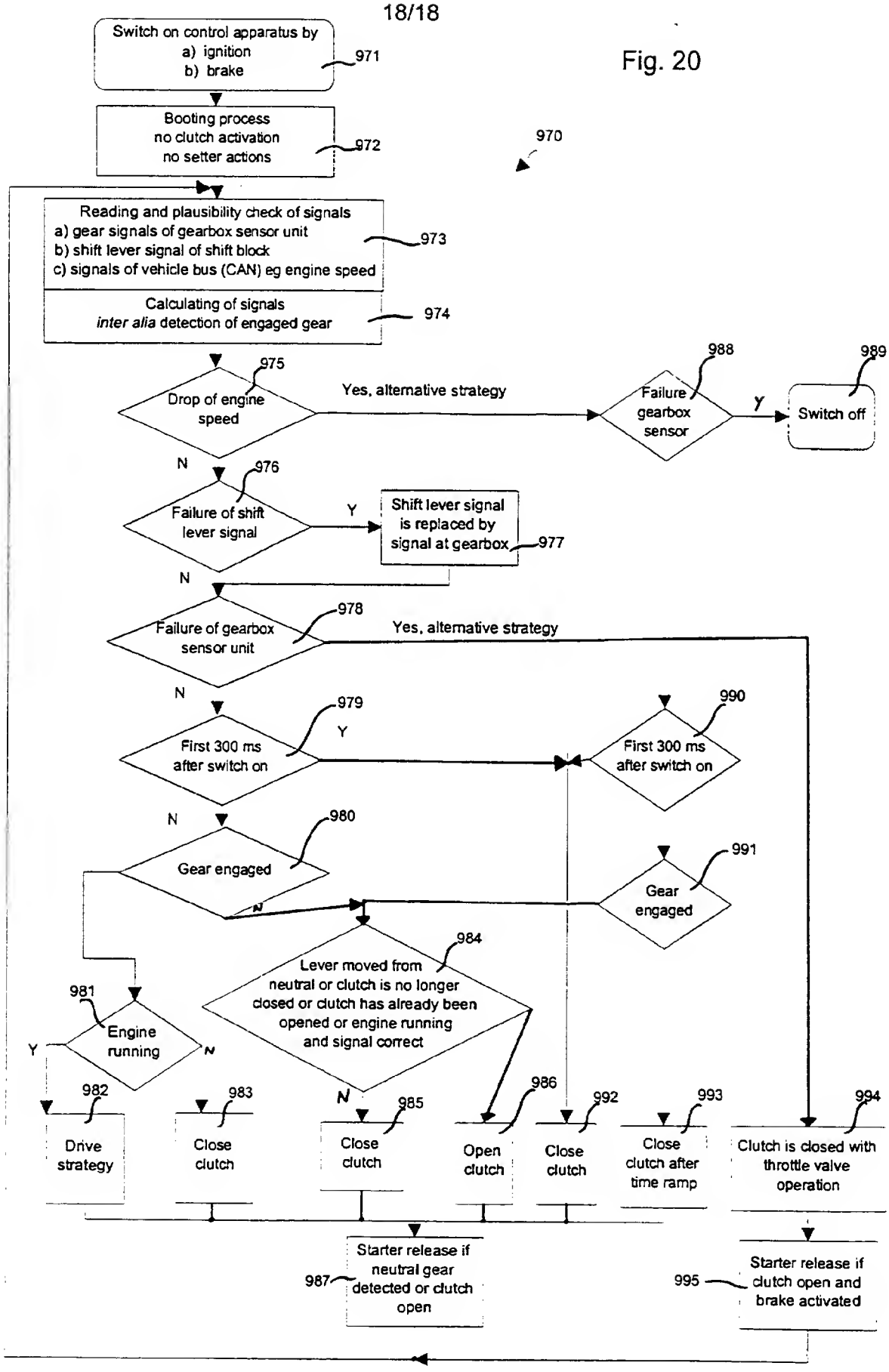

Switch on control device by
a) ignition
b) brake
941
Booting process
No clutch operation
No setter actions
942
940
Reading and plausibility check of signals
a) gear signals of gearbox sensor unit,
b) shift lever signal of shift block
c) signals of vehicle bus (CAN) eg engine speed
943
Calculation of signals
inter alia determination of engaged gear
944
Yes, alternative strategy
945
Drop of engine speed
N
946
Failure of shift lever signal
Y
947
Shift lever signal is replaced by signal at gearbox
N
948
Failure gearbox sensor unit
Yes, alternative strategy
N
949
Shift lever operation or opening process of clutch exists
Y
N
950
Engine starts (speed, starter)
Y
N
956
Failure gear box sensor unit
Y
959
Switch off
N
Close clutch or hold clutch closed
951
Open clutch or hold clutch open
952
Clutch is closed with throttle valve operation
954
With engaged gear the clutch constantly closes and opens with shift intent or in neutral
957
Starter release if neutral gear detected or clutch open
953
Starter release if clutch open and brake activated
955
Starter release if neutral gear detected or clutch open
958

Fig. 20


Switch on control apparatus by
a) ignition
b) brake
971
Booting process
no clutch activation
no setter actions
972
970
Reading and plausibility check of signals
a) gear signals of gearbox sensor unit
b) shift lever signal of shift block
c) signals of vehicle bus (CAN) eg engine speed
973
Calculating of signals
inter alia detection of engaged gear
974
975
Drop of engine speed
Yes, alternative strategy
988
Failure gearbox sensor
Y
989
Switch off
N
976
Failure of shift lever signal
Y
Shift lever signal is replaced by signal at gearbox
977
N
978
Failure of gearbox sensor unit
Yes, alternative strategy
N
979
First 300 ms after switch on
Y
990
First 300 ms after switch on
N
980
Gear engaged
N
991
Gear engaged
984
Lever moved from neutral or clutch is no longer closed or clutch has already been opened or engine running and signal correct
981
Engine running
Y
N
982
Drive strategy
983
Close clutch
N
985
Close clutch
986
Open clutch
992
Close clutch
993
Close clutch after time ramp
994
Clutch is closed with throttle valve operation
987
Starter release if neutral gear detected or clutch open
995
Starter release if clutch open and brake activated

2317660

MOTOR VEHICLE

The invention relates to a motor vehicle with a drive unit, such as a motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor, such as for example an operating unit with drive and transmission gear, controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine.

The invention further relates to a method for use for example inside a motor vehicle or in connection with a motor vehicle.

Motor vehicles with an automated torque transfer system are known for example from DE 19504847. The motor vehicles have as a rule an operating element for driver-side activation of vehicle assemblies which can be formed for example as an ignition lock with ignition key. By means of the ignition key it is possible to carry out on the one hand in a first ignition key position an activation of the vehicle assemblies in which for example the current to the assemblies is switched on. Furthermore by means of this ignition key, generally in another key position, it is possible for the engine start to be initiated by the driver through an attempt to start the engine.

With motor vehicles of this kind with an automated torque transfer system situations can occur which are critical to safety if on the driver side the engine of the vehicle, such

as internal combustion engine, is started up through an engine start attempt by means of the engine starting device for example with a gear engaged in the gearbox or with an engaged parking lock. With a start attempt under these conditions the vehicle can be moved unintentionally for example with a jerk forwards or backwards.

The critical situations can occur in dependence on the actual gear position wherein the vehicle is as a rule parked with closed clutch or the automatic torque transfer system automatically closes the clutch after parking the vehicle. If an attempt to start the engine is carried out when the gear is engaged and the clutch closed, then a jerky movement of the vehicle can occur.

The object of the invention is to provide a vehicle of the above kind which allows comfortable operation which is not critical to safety. Furthermore the object of the invention is to provide a vehicle of this kind in a simple and cost-effective way which nevertheless reaches and guarantees the desired comfort and necessary reliability and at the same time improves known systems.

Furthermore it is the object of the invention to provide a method for use within such a vehicle which allows safe use of the vehicle.

This is achieved according to the invention in that the control unit after driver-side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox disengages the torque transfer system and sends a starter release for engine start and when neutral position is not engaged does not send starter release for engine start.

This is further achieved according to the invention in that the control unit after driver-side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox sends a starter release for engine start and when neutral position is not engaged a brake is automatically operated and the torque transfer system is automatically disengaged and a starter release is granted for engine start.

According to a further inventive idea this can likewise be reached in that the control unit after driver-side activation of the control unit processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox sends a starter release for engine start and when neutral position is not engaged the torque transfer system is automatically controlled so that a predefinable torque is transferable by the torque transfer system wherein starter release for the engine start is not granted.

According to a further inventive idea a motor vehicle can be designed so that the control unit after driver-side activation of the control unit processes a sensor signal from a sensor which detects gearbox information, such as a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox checks the gearbox information supplied by the sensor and furthermore asks whether a vehicle brake is activated wherein if these conditions are met a starter release for engine start is granted and a starter release is not granted if at least one of these conditions is not met.

According to a particularly advantageous further development

of the invention a motor vehicle can be formed so that the control unit after driver-side activation of the control unit checks and processes a sensor signal from a sensor which detects gearbox information such as a neutral position engaged in the gearbox, wherein the control unit with fault-free sensor signal and with neutral position engaged in the gearbox grants a starter release and when neutral position is not engaged in the gearbox asks whether a vehicle brake is activated wherein with an activated vehicle brake disengagement of the clutch is controlled and a starter release is granted.

Furthermore according to a further inventive idea it can be reached that the control unit after driver-side activation of the control unit checks and processes a sensor signal from a sensor which detects gearbox information such as a neutral position engaged in the gearbox, wherein the control unit with fault-free sensor signal and with neutral position engaged in the gearbox grants a starter release and when neutral position is not engaged in the gearbox asks whether a shift intent signal is present wherein with a shift intent signal present disengagement of the clutch is controlled and a starter release is granted.

In a particularly advantageous manner this can also be achieved in that the control unit after driver-side activation of the control unit with at least a sensor for detecting a driver-side shift intent sends a signal to the control unit wherein with the presence of a shift intent signal it is determined by means of at least one sensor whether a neutral position is engaged in the gearbox and with the presence of an engaged neutral position a starter release is granted by the control unit.

According to a further inventive idea this can also be achieved in a particularly advantageous manner in that the

control unit after driver-side activation of the control unit with an engaged or disengaged torque transfer system only carries out a detection of the actual gearbox position if on the driver side an operation has been made to start up the engine and with an engaged neutral position a starter release is granted by the control unit and with a non-engaged neutral position a starter release is not granted.

This can likewise be achieved in that the control unit after driver-side activation of the control unit with an engaged or disengaged torque transfer system carries out a detection of the actual gearbox position, the torque transfer system remains in its actual position and if on the driver side an operation for starting the engine is carried out, it is questioned by the control unit whether a neutral position is engaged in the gearbox and with an engaged neutral position a starter release is granted by the control unit and with a non-engaged neutral position a starter release is not granted.

According to an advantageous development of the invention this can be reached if the control unit after driver side activation of the control unit with an engaged or disengaged torque transfer system questions a brake sensor whether a brake operation exists and with such a brake operation determines whether a neutral position is engaged in the gearbox, with an engaged neutral position the control unit grants starter release. A brake sensor of this kind can also be a brake light switch which is activated or switched on although still no brake action occurs with an activated brake. This sensor can also be operated from a predefinable braking action or can issue a signal.

It can be advantageous if with a granted starter release and with an existing attempt by the driver to start the engine the engine of the vehicle is started.

It can likewise be expedient if with a non-engaged neutral position or with an engaged drive gear and with a disengaged torque transfer system and activated brake, as well as with a running engine a value representing a driver-side accelerator pedal activation is questioned wherein with the presence of an accelerator pedal activation the brake activation is ended and the torque transfer system is engaged for starting the vehicle according to a predefinable characteristic.

Furthermore it can be expedient if with a non-engaged neutral position or with an engaged drive gear and with a disengaged torque transfer system and activated brake, as well as with a running engine a value representing a driver-side accelerator pedal activation is questioned wherein with the absence of an accelerator pedal activation the brake activation is ended and the torque transfer system is engaged controlled so that the vehicle creeps forward according to a predefinable characteristic.

According to a further inventive idea it can be advantageous if the controlled torque transferable by the torque transfer system is a predefinable minimum moment. It can be advantageous if the controlled torque transferable by the torque transfer system is substantially in the moment range between half and one tenth of the nominal torque of the drive unit. It can likewise be expedient if the controlled torque transferable by the torque transfer system is substantially in the moment range between 10 Nm and 100 Nm.

Furthermore it can be expedient according to a further inventive idea if the control unit determines from the sensor signals provided by the sensor whether the gear information is correct.

It can be advantageous if the control unit determines from

the sensor signals from the sensor that the gear information is faulty if the sensor value is outside of the predefined value range.

According to an additional further development of the invention it can be advantageous if the control unit with the use of more than one sensor determines from the sensor signals from the sensors that the gear information is faulty if the sensor values are outside of the predefined value range and/or have a non-predetermined correlation relative to each other.

According to a further idea according to the invention it can be advantageous if the control unit when using more than one sensor determines from the sensor signals coming from the sensors that the gear information is faulty if the sensor values are outside of the predefined value range and/or the sensor values have a non-predefined correlation relative to each other.

It can likewise be expedient if a gear information is evaluated by the control unit as faulty if a power supply of at least one sensor is below a predefinable boundary value.

It can furthermore be expedient if with the absence of a neutral position in the gearbox a starter release is not granted by the control unit.

It can likewise be expedient if with the absence of a neutral position in the gearbox an automatic disengagement of the torque transfer system is controlled before a starter release is granted by the control unit.

It can furthermore be expedient if with the absence of a neutral position in the gearbox an automatic operation of a vehicle brake or a vehicle stopping device or parking lock

device takes place and an automatic disengagement of the torque transfer system is controlled before a starter release is granted by the control unit.

According to a further inventive idea it can be expedient if after granting a starter release through the control unit the torque transfer system is automatically disengaged.

Furthermore it can be expedient if with the beginning of the for example driver-initiated engine start with a granted starter release through the control unit the torque transfer system is automatically disengaged.

According to a further inventive idea it can be expedient if the control unit after a driver-side activation interrogates a sensor which detects a neutral position engaged in the gearbox so that with an engaged neutral position a starter release is granted for engine start and with a non-engaged neutral position a brake is automatically activated and the torque transfer system is disengaged automatically and a starter release is granted for engine start.

It can furthermore be expedient if with an attempt to start the engine with an engine start release having taken place the engine starting device carries out a start of the engine, such as internal combustion engine.

Similarly it can be expedient if with an attempt to start the engine with an engine start release not carried out the engine starting device prevents a start of the engine, such as internal combustion engine.

According to an advantageous further development it can be expedient if the engine start attempt is carried out automatically or by the driver.

It can likewise be advantageous according to a further idea according to the invention if the control unit after switching on the ignition of the vehicle, such as flow of current to the vehicle circuit is switched on and initialized and with an attempt to start up the engine the control unit retrieves the actual gear position by means of a gear position sensor wherein with a gear engaged in the gearbox the torque transfer system is disengaged and the engine started.

According to a further inventive idea regarding a motor vehicle with a drive unit, such as engine, with an automated torque transfer system and a gearbox with a device for controlling the automated torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit is in signal connection with at least one sensor and where applicable with other electronics units such as for example with an engine electronics unit and/or an engine starting device, with an operating element on the driver side for activating vehicle assemblies, as well as for starting the vehicle engine, it can be advantageous if the control unit after a driver side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox wherein the control unit with a neutral position not engaged in the gearbox with an attempt to start the engine by the driver does not grant starter release for starting the engine, wherein with a neutral position engaged within a predefinable time length after the engine start attempt a starter release is granted for starting the engine and an engine start is automatically carried out.

It can be advantageous if the predefinable time is in the time range from 0.1 seconds to 10 seconds.

It is expedient if an automatic engine start is carried out only when a brake is activated.

According to a further inventive idea it can be particularly advantageous if a method is carried out for use in connection with a motor vehicle.

In order to produce the parking position or parking lock a gear can be engaged for example and the torque transfer system can be closed. Furthermore another mechanical lock can be blocked or fixedly braked within the gearbox in order to produce a parking lock.

The invention will be explained in further detail with reference to the drawings in which:

Figure 1 is a diagrammatic view of a motor vehicle;
Figure 2 is a block circuit diagram;
Figure 3 is a block circuit diagram;
Figure 4 is a block circuit diagram;
Figure 5 is a block circuit diagram;
Figure 6 is a block circuit diagram;
Figure 7 is a block circuit diagram;
Figure 8 is a block circuit diagram;
Figure 9 is a block circuit diagram;
Figure 10 is a block circuit diagram;
Figure 11 is a block circuit diagram;
Figure 12 is a view of a selector gate;
Figure 13 is a block circuit diagram;
Figure 14 is a block circuit diagram:
Figure 15 is a block circuit diagram;
Figure 16 is a block circuit diagram;
Figure 17 is a block circuit diagram;
Figure 18 is a block circuit diagram;
Figure 19 is a block circuit diagram; and
Figure 20 is a block circuit diagram.

Figure 1 shows a vehicle 1 with a drive assembly 2 such as for example a combustion engine or hybrid drive assembly for example with electric motor and/or energy accumulator, with a torque transfer system 3 and a gearbox 4 wherein a shaft 5 is mounted after the gearbox and drives by means of a differential 6 two drive shafts 7a and 7b which in turn drive the driven wheels 8a and 8b. The torque transfer system 3 is designed as an automatic torque transfer system. The torque transfer system 3 is shown as a friction clutch with flywheel 9, pressure plate 10, clutch disc 11, disengagement bearing 12 and disengagement fork 13 wherein the disengagement fork is biased controllable by an operating device, such as actor 15, for example with a master cylinder 16, a pressurised medium line 17, such as hydraulic line, and a slave cylinder 18. Furthermore a disengagement bearing 12 operable in a different way can also be used which is operable for example by a mechanically or electromotorized or hydraulic disengagement member such as for example central disengagement member coaxial with the gear input shaft.

The operating device or the actor 15 is shown as a pressurised medium operated actor which has an electric motor 19 which controls or operates through a gearing (not shown) the master cylinder piston 20 so that the torque can be engaged and disengaged through the pressurised medium line 17 and slave cylinder 18. Furthermore the actor 15 comprises the electronics for operating and controlling the actor 15, that is the power electronics as well as the control electronics. The actor is provided with a snifting bore 21 which is connected to a reservoir 22 for the pressurised medium. The control unit is thus integrated in the actor 15 wherein it can however also be installed in a separate housing.

The vehicle 1 with the gearbox 4 has manually operable gear shift lever 30. The gear shift lever is operated on the driver side to operate such as shift the gearbox or transmission ratios. It is possible by means of the gear shift lever to engage for example a gear within a selector gate of a gearbox or to engage neutral position within the gearbox. At least one shift intent sensor 32 is mounted on or associated with the manually operable gear shift lever and detects a shift intent of the driver from the movement of the shift lever, and/or from the force biased on the driver side. A shift intent of the driver can then arise for example if the driver operates the gear shift lever, such as force-biased, in order to disengage, change or engage a gear.

Furthermore at least one gear detection sensor 31 can be mounted or attached on the gearbox and/or on the gear shift lever to detect the actual gear position and/or the actually engaged gear, such as the actual gear translation. The gear detection sensor 31 can thereby comprise at least one analogue and/or digital sensor or switch. This at least one sensor detects directly or indirectly the position of shift elements inside the gearbox.

Furthermore the sensor 31 can also be formed as a neutral position sensor which issues a signal when a neutral position or a neutral area is engaged or present in the gearbox. This sensor detects not exactly the engaged gear but only whether the neutral position of a gearbox element is present. A neutral position sensor of this kind can be for example an analogue or digital sensor which questions the position of a component inside the gearbox when it is in the neutral position. If such an element is in the predefined position then neutral is indeed present, but if the element is not in this position then neutral does not exist.

Furthermore the vehicle is fitted with at least a speed sensor 33 which detects the speed of the gear output shaft and wheel speeds respectively. Furthermore a throttle valve sensor 34 is arranged which detects the throttle valve position and a speed sensor 35 is provided which detects the engine speed.

The gear detection sensor detects the position of shift elements inside the gearbox or the gear engaged in the gearbox so that by means of the signal at least the gear actually engaged is registered by the control unit. Furthermore when using an analogue sensor the movement of the shift elements inside the gearbox can be detected so that early detection of the gear engaged next can be carried out.

The actor 15 is fed by a battery 50 wherein the actor can have a permanent power connection. The power supply of the control unit and/or of the actor can be switched on and/or off for example by a switch.

A motor vehicle described above generally has an as a rule multi-phase switch, such as ignition switch 41 which as a rule can be operated by an ignition key. With a switch of this kind which can be operated by means of an ignition key the ignition key can be removed when in a switched-off position. In this position as a rule the assemblies of the vehicle are deactivated wherein individual assemblies can also still be activated for a predefinable period. In one position of the switch causing a switched-on state the assemblies of the vehicle are activated. In this position of the switch the ignition is switched on so that the electrical systems such as for example the control unit of the automated torque transfer system or other assemblies can be switched on and activated. In a further switch position the start of the drive unit of the vehicle, such as for

example internal combustion engine, is activated whereby the starter of the internal combustion engine 2 is activated or switched on through the lead 42.

A signal is sent through the lead 43 to the electronics unit of the actor 15 according to which for example when switching on the ignition the actor 15 is activated with its control electronics.

The motor vehicle furthermore has a sensor or switch 44 which is for example a brake switch which is connected by the signal lead 45 to the control unit. At the same time a brake light or display can be switched on by this switch via a further signal lead or electric lead. The brake switch detects the operation of a brake, such as operating brake 48 or parking brake 49. A switch of this kind can detect the operation of a pedal or another operating element of a brake.

It can be advantageous if when the ignition is not switched on, that is when the switch 41 is opened, the brake is operated and through this signal, that is through closing the switch 44, 46 through the connection 45, 47, the control unit of the actor 15 is activated so that with an operation of the gear shift lever, such as shift lever 30, for disengaging a gear before the ignition is switched on for example by an ignition key, a reaction of the automatic torque transfer system can take place and the clutch can be disengaged in good time.

The embodiment illustrated is not restricted only to a pressurised medium operated device but devices are also expedient which have a purely mechanical force transfer for disengaging the torque transfer system in cases of use. Devices of this kind operate a disengagement or disengagement bearing directly or through a rod linkage or

through a flexible connection.

The switch 44 such as can also be designed as a sensor, is not restricted to the function as a brake light switch. It can, as already mentioned above, monitor or question other functions such as for example switching the alarm system or central locking on or off.

Figure 1 shows a diagrammatic illustration of a motor vehicle 1 with a drive unit 2, such as internal combustion engine or engine, a torque transfer system 3, gearbox 4 in the drive train. Furthermore a differential 6 and wheels 8a,8b driven by the output shafts are also shown.

Wheel speed sensors (not shown) can be mounted on the wheels to detect the speeds of the wheels. The speed sensors can also belong functionally to other electronics units, such as for example an anti-blocking system (ABS). From at least one wheel speed it is possible by means of a control unit to determine at least one vehicle speed and/or gear speed. The sensor 33 detects a speed of the shaft 5 which is proportional to a speed of the gearbox or proportional to the wheel speeds.

The drive unit 2 can also be formed as a hybrid drive with for example an electric motor, a flywheel with freewheel and an internal combustion engine.

The torque transfer system 3 is formed as a friction clutch wherein the torque transfer system can also be formed for example as a magnetic powder clutch, multi-plate clutch or torque converter with converter bridging clutch or another clutch. The friction clutch can also be formed as a self-adjusting clutch adapting to wear.

Furthermore a control unit 15a can be seen as well as an

actor 15 shown diagrammatically. The control unit 15a can be formed as an integrated control unit which carries out the control or regulation of for example the torque transfer system, and where applicable other electronics units or actors. Furthermore the engine electronics units can also be integrated in the control unit. It is likewise possible that the control units of the torque transfer system, engine and/or other units are mounted separately and communicate with each other through data and signal lines. The control unit 15a is fitted with a computer unit in order to be able to process, store and convey the incoming signals and system values. Furthermore the control unit generates control values and/or signals for controlling the actors for operation.

The torque transfer system 3 is mounted on or connected to a flywheel wherein the flywheel can be a divided flywheel with primary mass and secondary mass, with a damping device between the primary mass and secondary mass on which a starting gear ring is mounted. The clutch has a clutch disc with friction linings and a pressure plate as well as a clutch cover and an energy accumulator such as plate spring. The self-adjusting clutch still has further means which allow adjustment and wear adjustment wherein a sensor, such as force or path sensor, is provided which detects a situation in which an adjustment is required and in the event of such detection can also be carried out.

The torque transfer system is operated by means of a disengagement member 13, such as for example pressurised medium operated, such as hydraulic, central disengagement member wherein the disengagement member can support a disengagement bearing 12 and the clutch can be engaged and disengaged by means of biasing. The disengagement member can however also be formed as a mechanical disengagement member which operates, biases or controls a disengagement

bearing or a comparable element.

The actor 15 such as operating unit, controls through a pressurised medium line 17 or transfer path, such as hydraulic line, the pressurised medium operated such as hydraulic, central disengagement member for engaging or disengaging the clutch.

The control unit 15 is connected through signal connections with the drive units of the actor so that control signals and/or sensor signals or operating state signals can be exchanged, passed on or retrieved. Furthermore a signal connection is provided through which the control unit is in signal connection at least at times with further sensors or electronic units. Such other electronics units can be for example the engine electronics, an anti-blocking system electronics or anti-slip control electronics. Further sensors can be sensors which generally characterise or detect the operating state of the vehicle, such as for example speed sensors of the engine or of wheels, throttle valve position sensors, accelerator pedal sensors or other sensors. The signal connection 15 forms a connection with a data bus, such as for example CAN bus, through which system data of the vehicle or other electronics units can be provided since the electronics units are as a rule linked together through computer units.

The vehicle is preferably fitted with an electronic accelerator pedal 50 or load lever wherein the accelerator pedal 50 controls or operates a sensor 51 by means of which an engine electronics controls or regulates for example the fuel supply, ignition timing, injection time or throttle valve position through the signal line 52 of the engine 2. The electronic accelerator pedal 50 with sensor 51 is in signal connection through the signal line 52 with the engine electronics. The engine electronics is in signal connection

through the signal lead with the control unit 15a. An electromotorized throttle valve control is expedient for example wherein the position of the throttle valve is controlled by means of the engine electronics. With such systems a direct mechanical connection to the accelerator pedal is no longer necessary or expedient.

The vehicle furthermore has an engine starting device 53 which beginning with an attempt to start up the engine by the driver by means of for example operating the ignition key in the ignition lock 41 control an engine electronics or starter for starting and/or starting up the engine. The engine starting device can comprise an electronic starter which automatically starts the engine, if at least a short-term signal comes from an operating element, such as from an ignition key. Furthermore the engine starting device can also only comprise the starter and the necessary electrics for starting the engine.

A starting process can however only be initiated if a starter release is provided by the control unit 15a and/or engine electronics. If the starter release is provided then the starter can be controlled and energized. If there is not starter release then an electric or electronic measure can be taken so that the starter does not start the engine. For example a relay can be locked or the power supply to the starter can be interrupted through an electronics unit. For example the control unit can set a start release bit which is interrogated when a start attempt is to be carried out. This start release bit can be set at 0 when a start release does not exist.

Based on a parked vehicle with the engine not running or substantially not running the vehicle can be parked by the driver with a gear engaged in the gearbox or with engaged neutral area. The control unit of the automatic torque

transfer system, after parking of the vehicle and after switching off the drive motor, closes the torque transfer system after a predefinable time or after reaching another for example event-controlled state. It can be advantageous if the control unit after turning off the vehicle and drive motor keeps the control unit activated with a where applicable restricted or non-restricted functioning during the period of an after-run time and at the end of the after-run time closes the torque transfer system and the control unit is deactivated. The present invention relates to patent application DE 19619348 whose contents expressly belong to the disclosure of the present application. The present invention further relates to patent application DE 19602874 whose contents expressly belong to the disclosure of the present application.

Figure 2 shows a diagram 100 for the development of the control or regulation when starting a motor vehicle or drive motor of a motor vehicle, more particularly with a relevant activation of an ignition key or a corresponding other element, such as a switch, code card or similar.

In block 101 the ignition is switched on for example by means of an ignition key and the control unit of the automated torque transfer system is thereby activated if it was not already activated earlier or previously in a different way. This activation can be a simple switch-on of the control unit or an activation of an integrated control computer which has to be started so that the computer or the control unit receives or guarantees its functional capacity. In block 102 it is asked whether the gearbox is in neutral position or whether neutral position is engaged.

This enquiry can be made by asking a sensor or when considering a sensor signal wherein the sensor only monitors and displays the position when the gearbox is in the neutral

position. The position of the shift lever in the selector gate can thereby be released by the sensor or not. In this case it is not relevant to know in which position the shift lever is located in the selector gate so long as the shift lever is in a position corresponding to neutral. Furthermore a gear detection sensor can detect the position or location of the shift lever in the area of the entire selector gate so that the sensor detects both the neutral area and also the positions of the engaged gears and the positions between the neutral area and the positions of the engaged gears. The question whether the neutral area is engaged can when using a sensor of this kind be restricted for example to the question whether the sensor signal lies in a predefinable value area which corresponds to neutral position. Similarly the sensor values can also be evaluated so that the actual gear position is recognized and a comparison is made whether the actual gear position is neutral position or not.

The invention further relates to the application DE 19548799 whose contents belong expressly to the disclosure of the present application.

A question can likewise be made as to whether sensor values exist which correspond to an engaged gear wherein through negation it is determined that the neutral area is engaged or not.

If the enquiry at block 102 is answered positive, thus there is neutral position, a starter release is provided in block 103 and the engine can be started up by the starter when the driver moves for example the ignition key into the position for starting the engine. There are also other possibilities for forming the driver-side engine start operation when the ignition is switched on, such as for example through a button or switch operation. In this case the starter is

activated and the engine is started.

The engine start can be carried out when neutral is engaged in the gearbox when the clutch is closed or opened. The clutch can remain in its actual position during a start made by the driver or it can be opened automatically before starter release and an engine start through the control unit and through the operation actor.

If the enquiry in block 102 is not answered positive, that is a gear is engaged in the gearbox, then in block 104 the clutch is opened automatically and at least one vehicle brake, such as parking brake or operating brake is operated automatically. This operation of the brake can be automatically carried out or begun slightly earlier than the opening of the clutch. The operation of at least one brake represents a safety measure to secure the vehicle against unintentionally rolling away since with a vehicle parked on an incline with a gear engaged and the clutch closed, a parking lock is produced which is lifted on opening the clutch and the vehicle could accidentally roll away. If with a vehicle parked with a gear engaged in the gearbox, the clutch is opened, then the opening of the clutch can stop in block 104. In block 105 a starter release is provided. With an attempt by the driver to start the engine the engine is started by means of the starter as shown in block 106.

In block 107 it is asked whether the throttle valve or accelerator pedal is activated or whether a switch, such as idling switch, detecting idling is not operated. Other values can also be detected which signal an operation of the accelerator pedal by the driver.

If an operation of the throttle valve or accelerator pedal exists then in block 108 the activated brake is released and

the torque transfer system, such as clutch, is closed at least slightly for starting the vehicle, so that conventional starting of the vehicle is possible. If operation of the throttle valve or accelerator pedal does not exist then in block 109 the brake of the vehicle is released and the clutch is closed at least so far that the vehicle creeps forward. The vehicle creeps forward preferably taking into account safety functions. Such safety functions can be characterised for example in that the vehicle has a speed-regulated creeping behaviour with a restriction of the engine moment used for creeping.

Figure 3 shows a flow chart or block diagram 150 for controlling or regulating the starter release when an attempt is made by the driver to start the vehicle. In block 151 the ignition key or a corresponding control element is operated and the control unit is activated if it was not already activated by other signals. If the control unit is ready for operation and activated, the control unit in block 152 evaluates the gearbox position detected by the neutral detection sensor or gear detection sensor. If neutral gear is engaged in the gearbox then in block 153 a starter release is provided and with an attempt to start the vehicle by the driver, for example by operating the ignition key in the engine start position the engine is started. If with the enquiry in block 152 the neutral position of the gearbox does not exist then in block 154 it can be checked whether a gear is engaged. It can likewise be assumed that a gear is engaged when the neutral position does not exist. This assumption can be carried out without the gear actually being engaged since as a rule an operating path is present between a neutral position and an engaged gear position.

If there is no neutral position present and a gear is engaged then the torque transfer system such as the clutch, is moved from the closed engaged position into a partially

opened engaged state, see block 155. The torque transferred by the torque transfer system is thereby reduced to a predefinable minimum moment. The minimum moment is thereby determined for example from a moment in order to hold the vehicle on an incline through the engine drag moment when a gear is engaged in the gearbox. It can be expedient if this minimum moment is in the order of from 50 Nm to 100 Nm or preferably in an area substantially between a tenth and a half of the maximum engine moment.

This reduction has the result that the torque transfer system can be quickly disengaged when needed. In block 156 no starter release is given.

Figure 4 shows a block diagram 200 for explaining a method in the event of a driver-side operation of for example an ignition key for activating the vehicle or of vehicle assemblies and where applicable for starting the vehicle engine. When switching on the ignition, see block 201 substantially all the assemblies of the vehicle are then switched on, activated and/or where applicable initialized. Some assemblies can however also be activated by other signals.

In block 202 it is asked whether the neutral gear or neutral position is engaged in the gearbox. With the engaged neutral gear there is no force locking connection between the gear input shaft and a gear output shaft. If neutral gear is not engaged and a gear is engaged in the gearbox then the clutch can be engaged or closed for guaranteeing or securing a parking lock. If neutral gear is not engaged then according to block 203 a starter release is not granted. With an attempt by the driver to start the engine the engine of the vehicle cannot be started by means of for example the starter.

If the neutral gear is engaged in the gearbox then it is asked in block 204 whether the gear recognition or neutral gear recognition operates fault-free. If this is not the case then in block 203 the starter release is not granted. If the gear or neutral gear detection is fault-free then in block 205 it is asked whether at least a vehicle brake, such as operating brake, and/or parking brake is operated. If this is not given then the starter release in block 203 is not granted. If at least one brake is activated, in block 206 a starter release is granted and with an attempt to start the engine by the driver the vehicle engine is started.

Figure 5 shows a block diagram 250 for controlling or regulating a torque transfer system, such as for example clutch, with an activation of vehicle assemblies and more particularly of the control unit of the torque transfer system, as well as with a following driver-side attempt to start the engine. In block 251 the vehicle and/or vehicle assemblies and/or control unit of the torque transfer system are activated by the driver, such as switched on or energized. This activation is preferably carried out by means of an ignition key. In block 252 after activation of the control unit it is asked in block 251 whether the gear detection or neutral gear detection operates fault-free. Furthermore in block 252 other self-tests can also be carried out. If the control unit evaluates the gear detection as not fault-free then in block 253 the starter release is not granted. If the gear detection in block 252 is judged to be fault-free then in block 254 it is asked whether the neutral gear is engaged. If this is the case then in block 256 the starter release is granted. If the neutral position is not engaged, then in block 255 it is asked whether at least one operating brake is activated. If this is not the case the starter release at 253 is not granted. If at least one brake is operated, then the starter

release is granted at 256.

Figure 6 shows a block diagram 300 for controlling or regulating a torque transfer system, such as for example a clutch with an activation of vehicle assemblies and more particularly with the activation of the control unit of the torque transfer system as well as with a following driver-side attempt to start the engine. In block 301 the vehicle and/or vehicle assemblies and/or control unit of the torque transfer system is activated, such as energized and/or switched on by the driver. This activation is preferably carried out by means of an ignition key. In block 302 after activation of the control unit in block 301 it is asked whether the gear detection or neutral gear detection works fault-free. Furthermore in block 302 other self tests can be carried out. If the control unit evaluates the gear detection as not fault-free in block 303 the starter release is not granted. If the gear detection in block 302 is judged as fault-free then in block 304 it is asked whether the neutral gear is engaged. If this is the case, then in block 306 the starter release is granted. If neutral gear is not engaged then in block 305 it is asked whether a shift intent signal exists. A shift intent signal is given by the control unit if for example by means of a sensor an operation or movement of a shift lever or a corresponding force action on the shift lever is detected. In this case this operation is interpreted as a shift intent on the driver side. If there is no shift intent then the starter release at 303 is not granted. If there is a shift intent signal then the starter release is granted at 306.

Figure 7 shows a further block diagram 350 of a design according to the invention of a method for using a device according to the invention for carrying out a vehicle start release or starter release for starting more particularly the vehicle or the vehicle engine. In block 351 the vehicle

circuit is closed by means of operating the ignition key and the assembly of the vehicle is switched on and/or activated. The clutch of the vehicle is as a rule in a closed position or setting before the control unit of the automatic clutch is activated. After switching on the power of the vehicle control circuit or after activating the control unit of the automatic torque transfer system such as clutch the clutch remains in its position located at the time of activation. If the clutch is engaged or disengaged at the time of activation then after activation of the control unit it remains at least initially likewise engaged/disengaged. Whether the clutch is engaged or disengaged in the deactivated vehicle state can depend on the gear engaged in the gearbox or the engaged gear position. For example the clutch with a drive gear engaged in the gear box can be preferably engaged wherein it can likewise be engaged when neutral position is engaged in the gear box. Furthermore the clutch can however also be disengaged.

In block 352 the driver-side operation or movement of the shift lever or gearbox is displaced substantially for changing the actual gearbox or such activation or movement is questioned. This question or display serves to detect or establish a driver-side shift intent. If no such movement or operation exists then no starter release is granted, but if such movement or operation exists as shift intent signal, it can proceed with block 353. It can likewise be advantageous if after a first time detection of such driver-side shift intent in block 352 it is continued in block 353. In block 353 it is questioned whether a neutral position or a neutral gear is engaged in the gearbox. If this is the case then at 355 a starter release is granted and the vehicle motor is started with an attempt by the driver to start the engine. If neutral gear is not engaged then at block 354 the clutch is opened and/or at least one operating brake is activated before a starter release is granted in

block 355.

Figure 8 show a further embodiment of a method according to the invention for controlling or regulating a torque transfer system or a vehicle with same, using a block diagram 400. In block 401 an activation of the vehicle and/or individual assemblies and/or control units can be carried out by means of an ignition key operation. In block 402 it is shown that with the position of the ignition key in IGNITION ON (ZUNDUNG EIN) the on-board power circuit is closed and assemblies or control units are activated accordingly. In block 403 it is shown that the clutch remains in its state, that is the closed clutch remains closed and an opened clutch remains opened. In block 404 a starter release is requested through an attempt by the driver to start the engine for example by activating the ignition key. After the request for the starter release in block 404 it is determined in block 405 by means of a gear detection by means of for example a gear detection sensor for example whether a neutral position or neutral gear is engaged in the gearbox. This is questioned in block 406. If this is the case then at 407 a starter release is granted and the engine is started. If there is no neutral gear, then at 408 no starter release is granted. Only by operating a shift lever and with the presence of a shift intent signal is the clutch disengaged.

Figure 9 shows a further embodiment according to the invention of a method for controlling or regulating a torque transfer system or a vehicle with same, from a block diagram 450. In block 451 an activation of the vehicle and/or individual assemblies and/or control units can be carried out by means of an ignition key operation. In block 452 it is shown that with the position of the ignition key in IGNITION ON (ZUNDUNG EIN) the on-board power circuit is closed and assemblies or control units are activated

accordingly. In block 453 it is determined by means of a gear detection by means of for example a gear detection sensor which gear is engaged in the gearbox or whether a neutral position or neutral gear is engaged in the gearbox. In block 454 it is shown that the clutch remains in its state, that is the closed clutch remains closed and an opened clutch remains opened. In block 455 a starter release is requested through an attempt by the driver to start the engine for example by activating the ignition key. In block 456 with the presence of a starter release request it is asked whether neutral is engaged in the gearbox. If this is the case, then at 457 a starter release is granted and the engine is started. If no neutral gear exists then at 458 no starter release is granted. The clutch also remains closed with this method up to input of a shift intent signal.

With the method of Figure 8 and 9 with the engaged neutral gear and with a closed clutch a starter release is granted if all necessary conditions are fulfilled. By starting the engine in this situation with an engaged clutch the gear input shaft is dragged during an engine start. It can be advantageous if with an engine start the clutch is quickly disengaged so that the drag moment of the gearbox exerts the smallest possible influence.

Figure 10 shows a further embodiment according to the invention of a method for controlling or regulating a torque transfer system or a vehicle with same, from the block diagram 500. In block 501 an activation of the vehicle and/or individual assemblies and/or control units is carried out on the driver side by means of an ignition key operation. The on board power circuit of the vehicle is closed with the position of the ignition key in the IGNITION ON and assemblies or control units are activated accordingly. In block 502 it is determined by means of a

sensor system whether at least one of the brakes, such as operating brake and/or fixing brake is operated. If no brake is operated or a selected brake is not operated a starter release is not granted in block 504. If a brake operation is present it is asked in block 503 whether the neutral gear is engaged in the gearbox. If this is the case then a starter release is granted at block 505.

Figure 11 shows a further embodiment according to the invention of a method for controlling or regulating a torque transfer system or a vehicle with same, from a block diagram 550. In block 551 an activation of the vehicle and/or individual assemblies and/or control units is carried out on the driver side by means of an ignition key operation. The on-board power circuit of the vehicle is closed with the position of the ignition key in IGNITION ON and assemblies or control units are activated accordingly. In block 552 the clutch is left in the position which it had already occupied before the activation. In block 553 it is determined by means of a sensor unit whether at least one of the brakes, such as operating brake and/or fixing brake is activated. If no brake is activated or a selected brake is operated in block 554 a starter release is granted. If a brake activation is present, in block 555 it is asked whether the neutral gear is engaged in the gearbox. If this is the case a starter release is granted at block 556.

Furthermore it can be expedient if further security aspects are taken into account and have to be fulfilled as a necessary condition before an engine start release is given. For example under these conditions questions can be on the closed safety contacts, such as door contacts, engine hood contacts, seat contacts and/or belt contacts. These contacts ensure that no situation could arise accidentally to jeopardize safety.

Figure 12 shows a selector gate 600 of a shift gearing such as for example a five speed gearbox. A four speed or six speed gearbox could also be used. The following is not restricted to special gearbox variation but applies generally for shift gears with a manually operable shift lever or the like.

By means of an operable shift lever 30, such as gear shift lever, the translations of the gearbox are shifted. The selector gate 600 has shift gates 601 and a selecting gate 602 between the shift gates. Operation within one shift gate can be regarded as shift movement and operation within the selecting gate can be regarded as selection movement.

The area 603 represents a narrower neutral area in which the shift lever is located if within the gearbox a neutral position or neutral gear is engaged. In this area there is no force locking between the gear input shaft and the gear output shaft. The neutral area 603 extends substantially over the entire selecting gate 602 and over partial areas of the shift gates 601.

The areas 604 correspond substantially to areas in which a gear is engaged or shifted in the gearbox or is regarded as shifted. Between the areas 603 and 604 is an area 605 in which a gear is still not shifted, but the narrow neutral area is already left.

If the shift lever is in area 603 then neutral position, neutral gear or a neutral area can be detected as present if for example shift elements inside the gearbox or the shift lever are monitored by means of at least one sensor. A comparison of the sensor values of the gearbox position sensors or gear detection sensors with for example reference values or characteristic lines can determine whether a neutral position is engaged in the gearbox or not. This can

be carried out for example by detecting or comparing whether the narrower neutral area exists. In this position or in this area it is not clearly detected which gear is shifted in the gearbox if no neutral position exists.

If sensor values are detected which characterise by comparison one of the value areas 604 then the engaged gear can also be detected.

As sensors can be used analogue operating sensors, such as echo sensors or potentiometers or other sensors. Digital operating sensors can also be used. These can be switches or buttons or similar and monitor a selected position.

The method or devices described above relate to automated shift gears with an automated clutch wherein the shift processes of the gearbox which is a non-load-switching gear is controlled by a control unit and is operated or carried out by an actor controllable by a control unit.

Figure 13 shows a block circuit diagram 700 for illustrating an embodiment of a method according to the invention or a use of a method in a motor vehicle according to the invention with a device according to the invention. In block 701 the ignition of the vehicle and thus also time delayed the control apparatus or the control unit of the automated clutch is switched off for example through the ignition key or another element. Thus the vehicle engine is also switched off. After switching off the ignition of the vehicle the clutch is engaged prior to deactivation of the control unit, see block 702, so that with a gear engaged in the gearbox a parking lock is produced and the vehicle cannot accidentally roll away.

By switching on the ignition in the block 703 of the vehicle the control unit is activated at block 704 and the micro

processor of the control unit is booted up or initialized. This means that inter alia programs are loaded up and implemented from the memory, memories are configured and data are loaded from a volatile or non-volatile memory, sensor data are interrogated and entered etc.

In block 705 the automated clutch is controlled by the control unit so that it is engaged over a predefinable period of for example 100 ms to 500 ms, such as more particularly 300 ms. With an automated clutch system with hydraulic line between actor and clutch activation this is advantageous in order to reach a defined starting state. The hydraulic path can thereby be relaxed or unloaded and the system can be calibrated or compensated.

In block 706 a sensor is interrogated which detects the engaged gear or gear state or a signal is interrogated which represents this state. It is asked whether a neutral area is engaged in the gearbox. If this is not the case in block 707 no clutch operation is carried out and the clutch remains substantially in its closed position. In block 708 the engine cannot be started. This means that the control unit of the automated clutch sends for example a signal to the engine control which signalizes that under the above conditions an engine start cannot take place. Similarly a relay can be switched which blocks the power to the starter or the starter itself for starting the engine.

In block 709 it is detected whether a shift lever movement such as shift intent exists. This can take place in that a path or force sensor is attached to the shift lever of the vehicle or is attached to an element connected therewith which detects whether an operating movement of the shift lever exists. If in block 709 there is no shift lever movement then in block 710 the clutch is not operated. If in block 709 a shift lever movement takes place in block 711

the clutch is activated and disengaged.

In block 717 a sensor is interrogated which detects the engaged gear or gear state, or a signal is interrogated which represents this state. It is asked whether a neutral area is engaged in the gearbox. If this is not the case, in block 718 the engine is held so that it cannot be started and if this is not the case the engine can be started in block 719.

If in block 706 the neutral area is engaged no clutch operation takes place in block 712. The engine can be started, see block 713, if a driver-side operation of the ignition key is carried out so that an engine start is to take place. In block 714 it is asked whether a shift lever movement is carried out and/or whether the engine is running. Whether the engine is running can be determined for example in that the engine speed lies above a predefinable boundary value of the engine speed, such as above for example 200 1/min. If this is not the case, in block 715 no clutch operation is carried out and if this is the case in block 714, in block 716 the clutch is opened or disengaged. Then it proceeds in block 717 as described above.

Figure 14 shows a block circuit diagram 750 which represents an embodiment of a method according to the invention. In block 751 the ignition of the vehicle is switched off and thus the entire system is switched off. Before deactivating the control unit the closing of the clutch is carried out in block 752 to produce the parking lock.

In block 753 by switching on the ignition of the vehicle, initialization of the micro controller of the control unit is carried out in block 754. After initialization in block 754, in block 755 it is asked whether a neutral gear is

engaged in the gearbox. This can be produced by checking a signal or sensor. If no neutral gear is engaged in the gearbox, then in block 756 no starter release is given by the control unit of the automated clutch. This information is conveyed for example through a data bus, such as CAN bus to the engine control unit. If no starter release is present then the engine control in the event of a start wish, such as operation by the driver of the ignition key for starting the engine, controls no engine start. In block 757 closing of the clutch is carried out for example over 300 ms for hydraulic compensation. Then it is asked in block 758 whether a shift intent is present, that is whether a movement of the shift lever is present. If this is the case, then in block 759 the clutch is opened. If there is no shift intent then the system is located in a waiting loop until a shift intent takes place through operating a shift lever.

If in block 755 no neutral gear is present in the gearbox, then in block 760 a starter release is given by the control unit of the automated clutch and transferred to the engine control. If for example the ignition key for starting the engine is operated by the driver of the vehicle, then the engine is started up by the engine control unit. In block 761 the clutch is closed for example for 300ms for hydraulic compensation of the transfer path. In block 762 it is asked whether the engine is running or a shift intent exists. The engine is running if for example an engine speed of $n_{mot} < 200$ rpm is detected or for example is transferred from the engine control unit to the control unit of the automated clutch. The presence of a shift intent is assessed by detecting a movement or force on a shift lever. If a shift intent exists or the engine is running, then in block 763 the clutch is opened, otherwise the system remains in the waiting loop 764 until the engine is running or a shift intent is present.

Figure 15 shows a block circuit diagram 800 for illustrating an embodiment of a method according to the invention. In block 801 the electronic control apparatus of the automated clutch is switched on, for example by an ignition key and its operation. In block 802 the micro processor of the electronic control unit is initialized.

In block 803 there is no clutch operation and the clutch remains closed or however the clutch is closed for example for relaxing a hydraulic path between the operating device, such as actor, and clutch. In block 804 it is asked whether the neutral gear is engaged in the gearbox. If this is the case, then in block 809 the engine is released for starting and in block 810 the clutch is opened. If there is no neutral gear in the gearbox then in block 805 the engine is held as not ready for starting, that is no starter release is given by the control unit of the automated clutch. In block 806 it is asked whether a shift lever movement or force introduction in the shift lever from the driver exists. If this is the case, then in block 808 the clutch is opened, if this is not the case, the clutch remains closed in block 807.

Figure 16 shows in a block circuit diagram 850 a further embodiment through which in block 851 the control unit is switched on and then in block 852 an initialization of the micro processor is carried out. In block 853 the clutch is closed for hydraulic compensation of the hydraulic path for example 300 ms. In block 854 it is asked whether a neutral gear is engaged in the gearbox. If a sensor or a signal indicates that the neutral gear is engaged in block 858 the starter release is given by the control unit of the automated clutch and this signal is sent for example through a CAN bus to the engine control so that with an attempt to start the engine this can also be started. In block 859 it is asked whether the engine is running or a shift intent,

that is a movement of the shift lever, exists. If this is not the case, then it waits in a waiting loop until this question is answered positively. If an engine speed or a shift intent is present then the clutch is opened in block 860. If a gear is engaged in the gearbox, which is not neutral gear, then in block 855 there is no starter release so that with an attempt to start the engine this is not started. Then it is asked in block 856 whether a shift intent exists as a result of a movement of the shift lever. If this is the case, then in block 857 the clutch is opened, otherwise it is waited in a waiting loop until there is a positive answer to a shift intent question.

Figure 17 shows a further embodiment in a block diagram 880. In block 881 the control unit of the automated clutch is switched on and in block 882 the microprocessor of the control unit is initialized or booted up. In block 883 the clutch is closed, for example for hydraulic compensation of the hydraulic path between the clutch operation actor and the clutch operation element, such as disengagement bearing. This compensation can take place for example in a fraction of a second, such as for example 300 ms. In block 884 the question is asked whether the neutral gear is engaged in the gearbox. If this is the case, then in block 89 the engine is switched or held ready for starting by a starter release and with an attempt by the driver to start up, the engine is started. In block 890 it is asked whether the engine is running or a shift lever movement exists. If this is the case, then in block 892 the clutch is opened, otherwise the clutch remains closed in block 891. If no neutral gear is engaged in the gearbox, then in block 885 no start release is granted and the engine cannot be started when an attempt is made by the driver to start up, an engine start by operating a starter is blocked. It is then asked in block 886 whether a shift lever movement is present. If this is the case, the clutch is opened, see block 888, or the clutch

remains closed otherwise, see block 887.

Figure 18 shows a further embodiment in a block diagram 900. In block 901 the control unit of the automated clutch is switched on and then in block 902 the micro processor of the control unit is initialized. In block 903 a snifting process is carried out for hydraulic compensation of a hydraulic path wherein this is only necessary if the operation between the operating actor and clutch disengagement has a hydraulic path or another pressurised medium path. Should mechanical connection exist between these elements, a snifting process or compensating process is not absolutely necessary. It is asked in block 904 whether a neutral gear is engaged in the gearbox. If this is the case, it is asked in block 908 whether the engine is running and the engine speed signal is correct or whether the clutch is already opened or whether the clutch is no longer closed or whether the shift lever is moved away from the neutral area. If this question is answered positively the clutch is opened at 910, otherwise it remains or becomes closed in block 909. If no neutral gear is engaged in the gearbox, then it is asked in block 905 whether the engine is running. If this is the case, in block 906 it is switched over to a conventional driving strategy, otherwise in block 907 the clutch is closed or held closed. Then in block 911 it is asked whether a neutral gear is engaged in the gearbox or the clutch is open. If this is the case, then a starter release is granted in block 912 so that the engine is also started with an attempt by the driver to start up the engine. If this is not the case, then no starter release is granted in block 913. The driving strategy indicated in block 906 corresponds to a clutch operation strategy in normal operation of the vehicle wherein for example the clutch is opened, when a shift process is present and then closed again at the end of the shift process or the clutch for driving the vehicle is progressively closed or opened

when the vehicle with an engaged gear is braked when stationary.

Figure 19 shows a further embodiment of a use of a device according to the invention or of a method according to the invention in a block circuit diagram 940. In block 941 the control apparatus of the automated clutch is switched on by

a) operating the ignition key for switching on the ignition of the vehicle

or

b) by operating a brake.

Reference is made here to DE-OS 19619348.6 whose disclosure expressly is included in the contents of the present application.

Then in block 942 a booting process or initialization process of the microprocessor of the control unit of the automated clutch is carried out. There takes place within this time period no clutch operation and no operation action of the actor, such as clutch operation actor. In block 943 the signals are fed in by the micro processor of the control unit of the automated clutch wherein signals of sensors or other electronics units can be read in for example by a CAN bus. These signals are then checked by a plausibility check, that is the signals are checked to see whether the values lie within a plausible predefinable value range. If this is not the case, then a signal error or sensor error is decisive. Particularly gear signals from a gear sensor or shift lever signals from a sensor on a shift lever or shift block or signals from a vehicle data bus, such as CAN bus are read in and checked. The gear signals from the gearbox sensor unit detect the engaged gear in the gearbox, the shift lever signal provides information on a shift lever

movement and the CAN bus signals can be for example engine speed or gearbox speed or wheel speed signals. These signals can however also be detected by means of their own sensors. In block 944 the signals of the sensors or of other electronics units are processed such as calculated in order to carry out for example the determination of the engaged gear. In block 945 it is checked whether the engine speed lies above a preset threshold value or whether the engine speed signal mainly exists or assumes a plausible value. If a fault in the signal of the engine speed is present, that is the engine speed signal is not plausible or does not exist then in block 956 it proceeds with a replacement strategy. It is then asked, if there is no fault in the engine speed, whether there is a fault in the shift lever signal, that is, that the signal of the sensor, which detects an operation of the shift lever, does not exist or is not plausible. If there is a fault then the shift lever signal is replaced in block 947 by a signal of the gearbox sensor unit. If a shift lever signal exists, in block 948 it is asked whether there is a failure of the signals of the gearbox sensor unit. If this is the case, then in block 954 it continues with a replacement strategy. If there is no failure in the gearbox sensor unit then it is asked in block 949 whether a shift lever operation exists or an opening process of the clutch exists. If this is not the case, then in block 950 it is asked whether the engine is started, that is whether either the starter is activated or an engine speed > 0 or 200 1/min can be detected. If the answer to the question in block 949 is positive then in block 952 the clutch is opened or held open. Otherwise after block 950 and its negative answer in block 951 the clutch is closed or held closed. Then in block 953 a starter release is granted if a neutral gear is engaged in the gearbox or the clutch is open.

For the replacement strategy in block 954 the clutch is

closed as a function of the throttle valve operation. This is necessary in order to reach that with a fault of the gearbox sensor system a comfortable engagement of the clutch can be achieved on the driver side wherein this takes place uncomfortably where applicable since matching the opening or closing speed of the clutch to the relevant engaged gear cannot take place since this engaged gear in the event of a fault of the gearbox sensor unit cannot be detected. Then in block 955 a starter release is granted when the clutch is open and a vehicle brake, such as for example the operating brake or parking brake is operated.

In the event of a loss of engine speed a replacement strategy is carried out in block 956 which contains an interrogation of the failure of the gearbox sensor system. If the gearbox sensor system has likewise failed then in block 959 the electronic control unit is deactivated and switched off. The vehicle cannot be driven. If no failure of the gearbox sensor system is present then in block 957 with an engaged gear the clutch is constantly closed as a function of the time and with a shift intent signal or with a neutral gear engaged in the gearbox is opened. A shift intent signal can be an operation of the shift lever. Then a starter release is granted in block 958 when the neutral gear is engaged in the gearbox or the clutch is open.

Figure 20 shows in a modification of Figure 19 an embodiment of the invention by a block circuit diagram 970. In block 971 the control apparatus is switched on by operating the ignition key or by switching on the ignition or by operating the brake. Then a booting up or initializing process of the micro processor of the electronic control unit of the automated clutch is carried out. In this time area of the booting up process no clutch operation and no action of the clutch operation actor or actor take place. In block 973 signals are fed in from the control unit and checked by a

plausibility check and in block 947 data batches are calculated or processed in order to carry out for example the determination of the engaged gear. In block 957 it is checked whether there is a drop in the engine speed. If this is the case then a replacement strategy is switched which in turn contains a question of the failure of the gearbox sensors in block 988. If this is likewise the case that the gearbox sensor unit has failed, then the system is switched off, see 989. If there is no drop in the engine speed, then in block 976 a failure of the shift lever sensor signal is checked. If there is a failure then in block 977 the shift lever signal is replaced by a signal of the gearbox sensor unit. Otherwise it is asked in block 978 whether there is a drop in the gearbox sensor unit. If this is the case, a replacement strategy is carried out which carries out an operation of the clutch with a throttle valve operation, see block 994 which means the clutch is closed with throttle valve operation as a function of the throttle valve operating degree. The closing of the clutch in dependence on the throttle valve operation can likewise take place in dependence on time. In block 995 the starter release is then granted if the clutch is open and a brake is activated. After block 978 or 988 a question is asked whether the system is located in the first 300 ms after switching on. If this is the case, then in block 992 the clutch is closed before a starter release is granted if a neutral gear is detected or the clutch is open or disengaged. If this is not the case, then in block 980 or block 991 it is asked whether a gear is engaged, that is a neutral gear is not engaged in the gearbox. If the question in block 980 is answered positively, then in block 981 it is asked whether the engine is running. If the engine speed is < 0 or < a predefinable value of for example 200 rpm, then it is switched over to a driving strategy in block 982. Otherwise the clutch is closed in block 983. If a gear is not engaged in the gearbox, that is the neutral gear is

engaged, it is changed accordingly from block 980 or 991 to block 984. It is questioned there whether the shift lever is moved as neutral or the clutch is no longer closed or the clutch is already opened or the engine is running and the engine signal, such as engine speed signal, is correct. If this is the case, then the clutch is opened in block 986, otherwise closed in block 985. Accordingly with a positive enquiry in block 991 the clutch is closed by means of a time slope as a function of the time. Then in block 987 a starter release is granted if a neutral gear is engaged or the clutch is already open. If the starter release is granted, that is positively granted, with an attempt by the driver to start the engine, the engine start can take place, otherwise the engine start cannot take place, that is the engine control does not carry out this engine start.

It can be particularly advantageous if individual method steps of various block diagrams of the embodiments are combined together.

The method described above for control can be used as normal operating control process. It is likewise possible that the methods are also used in part as emergency operating control methods which are carried out or activated in the event of failure of parts of the device of the automatic clutch, such as in the case of sensor failures or signal failures.

In a modification of for example Figure 13, in block 714 the clutch can likewise be disengaged if the control unit receives from the engine control a signal or bit which represents a running starter. This starter-activated bit is sent for example from the engine control through the CAN data bus when the starter is activated and drags the engine to speed. This modification can however also be integrated in another procedural method according to other figures.

The patent claims filed with the application are proposed wordings without prejudice for achieving wider patent protection. The applicant retains the right to claim further features disclosed up until now only in the description and/or drawings.

References used in the sub-claims refer to the further design of the subject of the main claim through the features of each sub-claim; they are not to be understood as dispensing with obtaining an independent subject protection for the features of the sub-claims referred to.

The subjects of these sub-claims however also form independent inventions which have a configuration independent of the subjects of the preceding sub-claims.

The invention is not restricted to the embodiment of the description. Rather numerous modifications and alterations are possible within the framework of the invention, more particularly those variations, elements and combinations and/or materials which are inventive for example through combination or modification of individual features or elements or method steps contained in the drawings and described in connection with those in the general description and embodiments and claims and lead through combinable features to a new subject or to new method steps or sequence of method steps where they relate to manufacturing, testing and work processes.

CLAIMS

1. Motor vehicle with a drive unit, such as engine, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox disengages the torque transfer system and sends a starter release for engine start and when neutral position is not engaged does not send starter release for engine start.

2. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox,

wherein the control unit with neutral position engaged in the gearbox sends a starter release for engine start and when neutral position is not engaged a brake is automatically operated and the torque transfer system is automatically disengaged and a starter release is granted for engine start.

3. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox sends a starter release for engine start and when neutral position is not engaged the torque transfer system is automatically controlled so that a predefinable torque can be transferred from the torque transfer system wherein starter release for engine start is not granted.

4. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine

start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit processes a sensor signal from a sensor which detects gear information, such as a neutral position engaged in the gearbox, wherein the control unit with neutral position engaged in the gearbox checks the gearbox data supplied by the sensor and furthermore asks whether a vehicle brake is operated wherein if these conditions are met a starter release for engine start is granted and a starter release is not granted if at least one of these conditions is not fulfilled.

5. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit checks and processes a sensor signal stemming from a sensor which detects gear information, such as a neutral position engaged in the gearbox, wherein the control unit with a fault-free sensor signal and with neutral position engaged in the gearbox grants starter release, with neutral position not engaged in the gearbox asks whether a vehicle brake is operated wherein with an activated vehicle brake a disengagement of the clutch is controlled and a starter release is granted.

6. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit checks and processes a sensor signal stemming from a sensor which detects gear information, such as a neutral position engaged in the gearbox, wherein the control unit with a fault-free sensor signal and with neutral position engaged in the gearbox grants starter release, with neutral position not engaged in the gearbox asks whether a shift intent signal is present wherein with the presence of a shift intent signal a disengagement of the clutch is controlled and a starter release is granted.

7. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit receives from at least one sensor for detecting a shift intent on the driver side a signal wherein with the presence

of a shift intent signal it is detected by means of at least one sensor whether a neutral position is engaged in the gearbox and with the presence of an engaged neutral position a starter release is granted by the control unit.

8. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit with engaged or disengaged torque transfer system only carries out detection of the actual gearbox position when on the driver side an operation has been carried out to start the engine and with an engaged neutral position a starter release is granted by the control unit and when neutral position is not engaged a starter release is not granted.

9. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control

unit with engaged or disengaged torque transfer system carries out detection of the actual gearbox position, the torque transfer system remains in its actual position and when on the driver side an operation has been carried out to start the engine it is asked by the control unit whether a neutral position is engaged in the gearbox and with an engaged neutral position a starter release is granted by the control unit and when neutral position is not engaged a starter release is not granted.

10. Motor vehicle with a drive unit, such as motor, with an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit with engaged or disengaged torque transfer system asks a brake sensor whether a brake activation exists and with such a brake activation determines whether a neutral position is engaged in the gearbox and with a neutral position engaged the control unit grants a starter release.

11. Motor vehicle according to one of claims 1 to 10 characterised in that with a granted starter release and with the presence of an attempt to start up the engine by the driver the engine of the vehicle is started.

12. Motor vehicle more particularly according to claim 1 or 2 characterised in that with a non-engaged neutral position or with an engaged drive gear and with a disengaged torque

transfer system and activated brake, as well as with a running engine, a value representing an accelerator pedal activation by the driver is questioned wherein with the presence of an accelerator pedal activation the brake activation is terminated and the torque transfer system is engaged for starting the vehicle according to a predefinable characteristic.

13. Motor vehicle according to one of the preceding claims, characterised in that with a non-engaged neutral position or with an engaged drive gear and with a disengaged torque transfer system and activated brake, as well as with a running engine, a value representing an accelerator pedal activation by the driver is questioned wherein with the absence of an accelerator pedal activation the brake activation is terminated and the torque transfer system is engaged controlled so that the vehicle creeps forward according to a predefinable characteristic.

14. Motor vehicle more particularly according to claim 3 characterised in that the controlled torque transferable by the torque transfer system is a predefinable minimum moment.

15. Motor vehicle according to claim 13 or 14 characterised in that the controlled torque transferable by the torque transfer system is substantially in the moment area between half and a tenth of the nominal torque of the drive unit.

16. Motor vehicle according to claim 13 or 14 characterised in that the controlled torque transferable by the torque transfer system is substantially in the moment range between 10 Nm and 100 Nm.

17. Motor vehicle according to one of the preceding claims, characterised in that the control unit determines from the sensor signals produced by the sensor whether the gear

information is correct.

18. Motor vehicle according to one of the preceding claims, characterised in that the control unit determines from the sensor signals from the sensor that the gear information is faulty if the sensor value is outside of the predefined value range.

19. Motor vehicle according to one of the preceding claims, characterised in that the control unit when using more than one sensor determines from the sensor signals from the sensors that the gear information is faulty if the sensor values are outside of the predetermined value range and/or have a non pre-defined correlation relative to each other.

20. Motor vehicle according to one of the preceding claims characterised in that the control unit when using more than one sensor determines from the sensor signals provided by the sensors that the gear information is faulty when the sensor values are outside of the predetermined value range and/or the sensor values have a non predefined correlation relative to each other.

21. Motor vehicle according to one of the preceding claims, characterised in that a gear information is evaluated by the control unit as faulty if a supply voltage of at least one sensor is below a predefinable boundary value.

22. Motor vehicle more particularly according to claim 7 characterised in that with the absence of a neutral position in the gearbox a starter release is not granted by the control unit.

23. Motor vehicle according to claim 7 characterised in that with the absence of a neutral position in the gearbox an automatic disengagement of the torque transfer system is

controlled before a starter release is granted by the control unit.

24. Motor vehicle according to claim 7 characterised in that with the absence of a neutral position in the gearbox an automated operation of a vehicle brake takes place and an automated disengagement of the torque transfer system is controlled before a starter release is granted by the control unit.

25. Motor vehicle more particularly according to claim 9 characterised in that after a starter release is granted through the control unit the torque transfer system is automatically disengaged.

26. Motor vehicle according to one of the preceding claims, characterised in that with the beginning of an engine start and with a granted starter release through the control unit the torque transfer system is automatically disengaged.

27. Motor vehicle with a drive unit, such as engine with an automated torque transfer system and gearbox and with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit interrogates a sensor which detects a neutral gear engaged in the gearbox so that with an engaged neutral position a starter release is granted for engine start and with a non-engaged neutral position a brake is automatically

operated and the torque transfer system is disengaged automatically and a starter release is granted for engine start.

28. Motor vehicle according to one of the preceding claims, characterised in that with an attempt to start the engine when an engine start release has been carried out the engine starting device carries out a start of the engine, such as internal combustion engine.

29. Motor vehicle according to one of the preceding claims, characterised in that with an attempt to start up the engine when an engine start release has not been carried out the engine start device prevents starting of the engine, such as internal combustion engine.

30. Motor vehicle according to one of claims 28 or 29 characterised in that the attempt to start the engine is carried out automatically or by the driver.

31. Motor vehicle with a device for controlling the torque transfer system of a motor vehicle with an engine, torque transfer system and gearbox, with an operating unit, such as an actor, controllable by a control unit, for operating such as engaging and/or disengaging the torque transfer system, with a control unit in signal connection with sensors and where applicable other electronics units, characterised in that the control unit after switching on the ignition of the vehicle, such as supplying current to the onboard circuit is switched on and initialized and with an attempt to the start the engine the control unit retrieves the actual gear position by means of a gear position sensor wherein with a gear engaged in the gearbox the torque transfer system is disengaged and the engine started up.

32. Motor vehicle with a drive unit, such as engine, with

an automatic torque transfer system and a gearbox, with a device for controlling the automatic torque transfer system with a control unit and an actor controllable by the control unit for operating the torque transfer system, the control unit stands in signal connection with at least one sensor and where applicable with other electronics units, such as for example with an engine electronics and/or an engine start device, with an operating element on the driver side for activating the vehicle assemblies, as well as for starting the vehicle engine, characterised in that the control unit after driver-side activation of the control unit receives and processes a sensor signal from a sensor which detects a neutral position engaged in the gearbox, wherein the control unit with neutral position not engaged in the gearbox with an attempt by the driver to start the engine grants no start release for starting the engine wherein with a neutral position engaged within a predefinable time duration after the engine start attempt a starter release is granted for engine start and an engine start follows automatically.

33. Motor vehicle according to claim 32 characterised in that the predefinable time is in the time range from 0.1 seconds to 10 seconds.

34. Motor vehicle according to claim 32 characterised in that an automatic engine start takes place only when a brake is activated.

35. Method for controlling an automatic clutch in the drive train of a motor vehicle with a control unit and an operating actor for activating the clutch, characterised in that at least one of the following method steps are carried out:

- checking the sensor data regarding gearbox position, engaged gear or neutral area, the engine speed, shift

lever movement, shift intent, brake activation, engine start ability, start release, plausibility of signals corresponding to a predefinable value range, absence of signals and/or clutch engagement state,

- opening or closing of clutch
- granting or refusing start release for engine start.

36. Method for use in connection with a motor vehicle, more particularly according to one of the preceding claims.

37. Motor vehicle with device for operating automated clutch in drive train, characterised by its special method of operation and configuration according to the present application documents.

38. Motor vehicle with a drive unit, such as engine, with an automatic torque transfer system substantially as herein described with reference to the accompanying drawings.

39. Method for controlling an automatic clutch in the drive train of a motor vehicle substantially as herein described with reference to the accompanying drawings.

The Patent Office

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Claims searched:	1 - 35	**Date of search:**	22 January 1998

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): F2D (DA), F2L(LD, LT)

Int Cl (Ed.6): B60K 28/00; F02N 11/10

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1003195 (BORG-WARNER) See page 10 lines 78 to 95.	1, 8, 35

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.